

















# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

(Lately Government Botanist of New South Wales and Director of the  
Botanic Gardens, Sydney).

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VOL. VIII.

PARTS 71—75 (1923—28).

(WITH 20 PLATES.)

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*Published by Authority of*

THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney :

ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER.

1933.





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*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney

ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER, PHILLIP STREET.

\* 88497—A

1933.







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BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

(Lately Government Botanist of New South Wales and Director of the  
Botanic Gardens, Sydney).

VOL. VIII. PART 1.

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PART LXXI OF THE  
COMPLETE WORK.  
(WITH FOUR PLATES.)

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PRICE THREE SHILLINGS AND SIXPENCE.

*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney:  
ALFRED JAMES KENT, GOVERNMENT PRINTER.

1929.

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BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

(Lately Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

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The author of this standard work, Mr. J. H. Maiden, I.S.O., F.R.S., F.L.S., died on 16th November, 1925, at the age of 66 years.

It is most regrettable that he did not live to see the completion of his great work, of which 65 Parts have already appeared, and the final Parts were prepared by him for publication prior to his death.

With the kind permission of Dr. Darnell-Smith, Director, Botanic Gardens, Sydney, this and the subsequent Parts will be edited by Messrs. R. H. Cambage, C.B.E., F.L.S., and W. F. Blakely, Assistant Botanist, Botanic Gardens, both of whom have been in constant touch with the late Mr. Maiden during the progress of the work.

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## VOL. VIII. PART 1.

### Part LXXI of the Complete Work.

(WITH FOUR PLATES.)

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*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

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*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney:

ALFRED JAMES KENT, GOVERNMENT PRINTER, PHILLIP-STREET.



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## DESCRIPTION.

### *CCCLXXXIII. E. Bucknelli* Cambage.

In *Proc. Linn. Soc., N.S.W.*, li (1926), 325, with Plate 22.

**FOLIA MATURA** lanceolata, longa circa 6–15 cm., lata 1–3 cm., cum punctis rectis aut uncinatis, viridia prope cinerea, interdum glauca in utramque partem, glabra, costa media distincta, venae laterales aliquanto prominentes, dispositae ex costa media cum angulo circa 45–55 graduum, cum venularum tenuiorum reticulo interveniente, vena intra marginem aliquanto procul margine, glandulae olei parvae sed multae, petiolus longus 2 mm. ad 1 cm.

**Gemmæ** clavatae, in breve pedicellatae, acutae leviter glaucae calycis tubus aliquanto campanulatus longus 3–4 mm., staminis annulus parvus sed distinctus, directus, operculum in coniforma longum 2–3 mm.

**Fructus** in piri aut ovi forma, truncati, longi 4–5 mm., diametros 3–6 mm. valvae fere exsertae, pedunculi longi 5 mm. ad 1.4 cm.

A tree about 40 feet high, with stem-diameter of 18 inches to 2 feet.

**Branchlets** terete, brown to glaucous.

**Mature leaves** lanceolate, from about 6 to 15 cm. long, 1–3 cm. broad, with straight or hooked points, greyish-green to sometimes glaucous on both sides, glabrous, midrib distinct, lateral veins fairly prominent, arranged at an angle of from about 45 to 55 degrees with the midrib, with a network of finer veinlets between, intramarginal vein fairly distant from the edge, oil glands small but numerous, petiole 2 mm. to 1 cm. long.

**Buds** clavate, shortly pedicellate, acute, slightly glaucous, calyx-tube somewhat campanulate, 3–4 mm. long, staminal ring small but distinct, vertical, operculum conical, 2–3 mm. long.

**Flowers** pedicellate, umbels chiefly in terminal panicles, with three to seven flowers, anthers semi-terminal, broad, somewhat like those of *E. crebra*, gland at back, filament nearly at the base.

**Fruits** pyriform to ovoid, truncate, 4–5 mm. long, 3–6 mm. in diameter, valves usually exserted, peduncles 5 mm. to 1.4 cm. long.

**Bark** shortly fibrous to slightly furrowed.

**Timber** reddish-brown, very hard, heavy and interlocked.

**Habitat.**—About 20 miles north of Mungindi (type), Mookoo, and at Bumble in Queensland. About 15 miles south-east of Moree (Forest Guard W. M. Brennan).

This species is named in honour of Adrian Wentworth Bucknell, Licensed Surveyor of Mookoo, who is much interested in the local plants, and has supplied many native names.

## AFFINITIES.

Its closest affinity appears to be with *E. melanophloia* and *E. microtheca*, but it seems to be more closely associated with the former in the forest, the two species often growing together, while *E. microtheca* may be a quarter of a mile away. *E. populifolia* and *E. bicolor* may be also growing near. Its bark on the trunk and branches may be described as being between that of a box tree and an ironbark, while the fruits somewhat resemble those of *E. microtheca*, although the valves of the latter are more exserted. In shape, the fruits are not unlike those of *E. melanophloia*, especially those from about 20 miles north of Mungindi (No. 4,462).

The small-fruited form of *E. Bucknelli* (No. 4,389) from the south of Mungindi somewhat resembles *E. populifolia* and *E. bicolor* so far as the fruits are concerned, but the leaves and venation are different.

From *E. Yagobie* Maiden it differs mainly in the shape of the fruits and to some extent in the bark. The fruits of *E. Yagobie* have strongly exserted valves.

If it could be shown that this tree originated as a hybrid, then its parents would appear to be *E. melanophloia* and *E. microtheca*, but the trees are so numerous that it seems evident the species now reproduces itself, whatever may have been its origin. It is remarkable that where natural *Eucalyptus* hybrids are suspected, one of the supposed parents often belongs to the group of trees popularly known as Ironbark, while the other belongs to the Box group.

*Seedlings* (No. 4,402 from Bumble). Plate 22, fig. 1. (*Proc. Linn. Soc. N.S.W.*)

*Hypocotyl* terete, red, glabrous, 6 mm. to 1.5 cm. long.

*Cotyledons* obtusely oblong to slightly reniform, entire, 2 to 2.5 mm. long, 3 to 5.5 mm. broad, upperside green, underside pale green; petiole 2 to 3 mm., reddish near base.

*Stem* terete, red. First and second internodes, 3 to 5 mm.; third, 4 to 6 mm.

*Seedling foliage* opposite for at least four or five pairs,\* entire, glabrous, linear-lanceolate, upperside green, underside pale green, petiole 1 to 1.5 mm. First pair 5 to 8 mm. long, 1.5 to 2.5 mm. broad; second pair, 9 mm. to 1.3 cm. long, 1.5 to 3 mm. broad; third pair, 1 to 1.4 cm. long, 2 to 3 mm. broad.

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\* Since found to be sometimes as many as twenty pairs.—R.H.C.

## DESCRIPTION.

*CCCLXXXIV. E. perplexa* Maiden and Blakely, n.sp.

IRONBARK mediocris; cortice obscuro, valde sulcatis; foliis junioribus oblongis; foliis maturis oblongis vel oblongo-lanceolatis, tenuibus, inconspicue venosis, petiolatis, 4-8 cm. longis, 1-2.5 cm. latis; fructu globoso, pedicellato, truncato vel valvis exsertis, 4-5 mm.

A medium-sized ironbark; bark dark-coloured, deeply furrowed.

**Juvenile leaves**, not seen in the earliest stage, oblong, obtuse. Young twigs slightly pruinose.

**Intermediate leaves**, also imperfect, alternate, broadly oblong to oblong-lanceolate, usually emarginate, 4-9 cm. long, 2-3 cm. broad, shortly petiolate.

**Adult leaves** alternate, petiolate, oblong to lanceolate, often somewhat obtuse or minutely apiculate, 4-8 cm. long, 1.5-2.5 cm. broad. Venation obscure, the midrib slightly raised beneath, flat or very faintly furrowed above; lateral veins very fine, diverging at an angle of 35-45° with the midrib; intramarginal vein very close to the revolute margin, or confluent with it.

**Inflorescence** forming small axillary or terminal panicles. Buds not seen.

**Fruit** sub-globose, 4 x 5 mm., truncate, pedicellate, the very small valves sometimes exsert.

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RANGE.

It seems to be confined to tropical Western Australia and the Northern Territory. The following are the localities:—

*Western Australia*: Between Erskine Range and Mount Marrion, August, 1906. "On gravelly plains between Isdell River and Scented Knob occurs, of a few square miles in extent, an open forest of Ironbark" (W. V. Fitzgerald, June, 1905); Isdell River, near Mount Barnett Homestead, also at Barnett River (W. V. Fitzgerald, June, 1905).

*Northern Territory*: Roper River Crossing (Professor Baldwin Spencer, and others, July-August, 1911). This specimen is not quite so glaucous as the previous specimens.

## AFFINITIES.

### 1. With *E. crebra* F.v.M.

The similarity as regards the leaves is obvious, but those of *E. perplexa* are more oblong and glaucous than those of *E. crebra*. The small fruits of *E. perplexa* are undoubtedly somewhat similar to those of *E. crebra*, but the fruits of the former are more spherical and more glaucous than those of the latter.

### 2. With *E. Culleni* Cambage.

This is also a tropical Ironbark, but the leaves are greener, the fruits, although somewhat spherical, are distinct in shape and size from the fruits of *E. perplexa*.

### 3. With *E. melanophloia* F.v.M.

This appears to be its closest affinity as regards glaucousness and the shape of the fruit. In fact, it was regarded as a lanceolate-leaved form of *E. melanophloia*, but we now think that it is a species distinct from *E. melanophloia*.

## DESCRIPTION.

### CCCLXXXV. *E. conglomerata* Maiden and Blakely, n.sp.

ARBOR parva, stringybark; cortice aspero, fibroso, sulcato; foliis junioribus, lineari-lanceolatis, stellato-pilosis; foliis maturis lanceolatis vel obliquo-lanceolatis, 6-12 cm. longis,  $1\frac{1}{2}$ -3 cm. latis; alabastris parvis, numerosis confertis in capitulis densis; fructu urceolato vel globoso, sessili in capitulis parvis globoso.

A small Stringybark, 12-20 feet high; bark rough, thick, fibrous, deeply furrowed.

**Juvenile Leaves** not seen in the earliest stage, alternate, sessile to very shortly petiolate, narrow-lanceolate, somewhat scabrous, with minutely denticulate, slightly revolute margins and when very young stellate-hairy, 1.5-4 cm. long, 4-8 mm. broad. Venation obscure.

**Intermediate Leaves** alternate, very shortly petiolate, narrow-lanceolate to obliquely lanceolate, thick, light green, 4-8 cm. long, 1.5-3.5 cm. broad; venation obscure, lateral veins diverging at an angle of 40-50° to the midrib; intramarginal vein close to the edge.

**Mature Leaves** alternate, petiolate, lanceolate to obliquely lanceolate or falcate-lanceolate, thick, coriaceous, somewhat glossy, 6-12 cm. long, 1.5-4 cm. broad; venation rather fine and somewhat obscure; lateral veins spreading at an angle of 25-30° to the midrib; intramarginal vein close to the edge.

**Inflorescence** in axillary umbels of 10-18 small, sessile flowers. Buds slender, cylindrical, scarcely acute, about 5 mm. long; the peduncle 8-10 mm. long, usually strap-shaped. Anthers reniform, with a small terminal gland.

**Fruit** sessile or nearly so, congested in dense, globular heads, pilular to slightly urceolate, with a broad orifice and a small oblique disc, about 5 x 5 mm., 3-4 celled, the very short deciduous valves enclosed.

## RANGE.

It seems to be confined to Southern Queensland and the northern parts of New South Wales. In the latter State it has been found at Denman (W. Heron), Armidale district (A. W. Howitt, March, 1903). Queensland—Small trees, 12-20 feet high; bark stringy; ultimate branches naked. Sandy country on edge of peat swamps, Beerwah, Southern Queensland (W. D. Francis and C. T. White, No. 24, September, 1919). The type.

## AFFINITIES.

### 1. With *E. eugenioides* Sieb.

It is readily distinguished from this species by its narrower suckers, densely packed buds and small globular fruits. It appears also to be a smaller tree than *E. eugenioides*.

### 2. With *E. globotidea* Blakely.

Both species are typical stringybarks, and they resemble each other a great deal in the compact, more or less conglomerate fruits, but the juvenile leaves of *E. conglomerata* are much narrower than those of *E. globotidea*.



## DESCRIPTION.

CCCLXXXVI. *E. tropica* Cambage.

In Proc. Roy. Soc. N.S.W., 1915, 49 p. 425, *ibid* 1927, 61.

ARBOR alta 30 ad 40 pedes cortex in trunco et ramis magnis albidus et breviter fibratus.

*Folia*.—Folium adulatorum textura densa, ovata-lanceolata ad lanceolata, interdum falcata, longa 2 ad 5 uncia, lata uncia  $\frac{3}{4}$  ad 1 unciam, albida aliquanto viridia, quum sicca colorem subflavum habentia, venae laterales cum angulo circa 50 ad 65 graduum ex costamedia, vena intra marginem prope vero in margine, petioli longi circa 1.5 ad 2 cm.

Fructus abconicales, longa 4 ad 6 mm., diametros 6 ad 7 mm., valvae exsertae.

A tree 30 to 40 feet high with greyish, shortly-fibrous, box-bark on trunk and large branches.

**Adult leaves** thick in texture; ovate-lanceolate to lanceolate, sometimes falcate, from 2 to 5 inches long,  $\frac{3}{4}$  to 1 inch broad, greyish-green, with yellowish tint when dry, lateral veins at angle of about 50 to 65 degrees with midrib, intramarginal vein practically on the edge, petioles from about 1.5 to 2 cm. long.

Fruits obconical, 4 to 6 mm. long, 6 to 7 mm. in diameter, valves exserted.

Buds or flowers not seen.\*

**Habitat**.—Near the Corella River, about 30 miles north of Cloncurry, on the road to Granada, No. 4,163. (Type.) It is known as White Box. Also probably seen from the train just east of Cloncurry, but not collected. Both localities are in the tropics.

## AFFINITIES.

This species has some affinities with *E. microtheca*, (Coolabah) but its fruits are more conoid than those of the latter species, the pedicels and leaves much thicker, and the venation different. Moreover the Coolabah grows on the Black soil plains, a situation which this White Box seems to avoid.

In the forest this species closely resembles *E. microneura*, (No. 4,162) and in August, 1913, with only scant material available, was regarded as probably the same species, but on production of further specimens collected by Mr. C. T. White in February, 1922, and after consultation with Messrs. Maiden and Blakely, it was considered these two trees were separate species. The fruits of *E. tropica* are larger, the valves more exserted, and the leaves thicker in texture than those of *E. microneura*.

The juvenile leaves described in 1915 are from the Croydon plant.†

\* Proc. Roy. Soc. N.S.W., 1915, 49, 425. Also 1927, 61. The Forsyth-Georgetown tree (No. 4,162), has since been described as *E. microneura* Maiden and Blakely, Proc. Roy. Soc. N.S.W., 1925, 59, 168, while the Croydon plant has been tentatively placed with *E. tropica*.

† Proc. Roy. Soc. N.S.W., 1915, 49, 424.

The fruits of *E. siderophloia* Benth. somewhat resemble those of *E. tropica*, but in other respects the trees are quite dissimilar, the former being an Ironbark while the latter is a box-tree.

*E. Bowmani* F.v.M., from Queensland, has never been identified as the fruits are unknown, but the marginal vein of the leaf is described as being "at a distance from the edge," while that of *E. tropica* is close to the edge.

*Seedlings* (No. 4,163 from Corella River).

*Hypocotyl* terete, reddish-pink to brownish-red, glabrous, 7 mm. to 1.2 cm. long.

*Cotyledons* reniform, up to 4 mm. long, 5 to 7.5 mm. broad, upperside green, underside reddish to brownish-red, petiole about 3 mm. Two opposite nodules form in axils of cotyledons.

*Stem* at first slightly angular, becoming terete, reddish near the base. First internode 5 mm. to 1.3 cm.; second 6 mm. to 1 cm.; third 8 mm. to 1.3 cm.; fourth to eighth 1 to 1.7 cm.

*Seedling foliage* opposite for at least eight or nine pairs, entire, glabrous, linear-lanceolate to lanceolate, tapering at both ends, upperside greyish-green, underside paler or in the first two pairs sometimes reddish, midrib prominent underneath, lateral veins arranged at angles of 40 to 60 degrees with midrib in the case of No. 2, and from 50 to 65 degrees in subsequent pairs. First pair 1.2 to 2.5 cm. long, 2-4 mm. broad; second and third pairs 2.2 to 3.8 cm. long, 3 to 8 mm. broad; fourth to seventh 3 to 5 cm. long, 5 mm. to 1 cm. broad.

## DESCRIPTION.

CCCLXXXVII. *E. pseudo-piperita* Maiden and Blakely, n.sp.

ARBOR 20–40 pedes alta; cortex caulinus persistens, sub-fibrosus; cortex ramorum glaber; folia juvenilia ovato-lanceolata, alternata, breviter petiolata, pallide viridia; folia matura alternata, petiolata, lanceolata vel oblique-lanceolata, 5–10 x 1.3–4.7 cm.; gemmæ clavatæ, acutæ, pedicellatæ; umbellæ florum axillares; antheræ reniformes; capsulæ globulares, sessiles vel breviter pedicellatæ, 6–7 x 6–7 mm.

A tree 20 to over 40 feet high; bark persistent on trunk, and intermediate between a Stringybark and the Peppermint type, smooth and ribbony on the branches; branchlets quadrangular, but soon becoming terete.

**Juvenile leaves** not seen in the earliest stage, shortly petiolate, alternate, ovate to broadly-lanceolate, light green on both sides, 6 x 4 cm.; venation penninerved, moderately distinct; lateral veins diverging at an angle of 30–40° to the midrib; intramarginal vein distant from the edge.

**Intermediate leaves** alternate, petiolate, broadly lanceolate to obliquely lanceolate, 11 x 5 cm., light green on both surfaces; lateral veins distinct, diverging at an angle of 40–45° to the midrib; intramarginal vein distant from the edge.

**Mature leaves** alternate, petiolate, lanceolate to obliquely lanceolate, somewhat thick, not very aromatic, 5–10 cm. long, 1.3–4.7 cm. broad. Venation penninerved, the midrib somewhat obscure above, distinct beneath; lateral veins spreading at an angle of 40–45° with the midrib; intramarginal vein usually close to the edge.

**Inflorescence** in axillary umbels, but sometimes forming short panicles; peduncles compressed, 6–10 mm. long, about 1.5 mm. broad. Buds up to 14 in the head, somewhat clavate, acute, very shortly pedicellate, 5–6 mm. long, the pedicels somewhat variable in length and thickness. Calyx funnel-shaped, rather thick; operculum acutely conoid, about as long as the calyx-tube. Filaments very slender; anthers reniform, white, with broad cells and a small terminal gland.

**Fruit** globular or nearly so, sessile, or very shortly pedicellate, truncate, thick, 6–7 x 6–7 mm.; the disc small, forming a flat ring around the top of the orifice, 4-celled, the partitions extending nearly to the disc; valves small, enclosed.

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RANGE.

In the present state of our knowledge it appears to be confined to a small coastal strip between Sydney and Oatley. The following are the localities:—Oatley (J. H. Camfield, April, 1901); Hurstville (same collector, July, 1897). The fruits are depicted on Plate 45, fig. 7c. The bark is more fibrous than that of the typical *E. piperita*, and is more like the Stringybark type. In part X, p. 305, the above specimen is referred to as follows:—"At Oatley, George's River, near Sydney (J. H. Camfield), we have a form apparently normal *piperita* in every respect, except that the fruits are very coarse and large, thick-rimmed, and nearly pilular. They certainly show affinity to *E. pilularis*, for which the fruits can be readily mistaken. I would call them an intermediate form." Taronga Park (A. S. Le Souef, D. W. C. Shiress). Co-type. La Pouse (J. L. Boorman). The fruits are thinner than the above specimen, but they are not fully matured.

## AFFINITIES.

1. With *E. pilularis* Sm.

The mature leaves, buds, and fruits of *E. pseudo-piperita* resemble some specimens of *E. pilularis*, but the juvenile leaves are much broader, more aromatic, and of a darker green than those of *E. pilularis*.

2. With *E. piperita* Sm.

The leaves have almost the same aromatic perfume as those of *E. piperita*, but the buds, fruits and juvenile leaves are coarser. The bark is also different; it is more of a Stringybark than a Peppermint bark.

## DESCRIPTION.

*CCCLXXXVIII. E. urceolaris* Maiden and Blakely, n.sp.

ARBOR recta 50–80 pedes alta; cortice sub-fibroso in trunco; ramulis levibus; foliis junioribus sub-glaucis elliptico-lanceolatis; foliis maturis falcato-lanceolatis, crassis, coriaceis, alabastris pedicellatis.

An erect tree 50–80 feet high, up to 4 feet in diameter; bark rough, sub-fibrous on trunk and main branches, smooth and ribbony on the small branches.

**Juvenile leaves** sessile, ovate, cordate, or elliptical-lanceolate, thick, coriaceous, dark-green above, pale beneath, 4–8 cm. x 2–4.5 cm.; venation rather prominent on both sides; lateral veins few and distant, diverging at an angle of 40–45° with the midrib; intramarginal vein fairly close to the edge.

**Intermediate leaves** not seen in a fully developed state, petiolate, thick, coriaceous, elliptical to obliquely lanceolate, slightly glaucous, 7–9 x 5 cm.; lateral veins diverging at an angle of 30–40° to the midrib; intramarginal vein distant from the edge.

**Mature leaves** petiolate, lanceolate to obliquely-lanceolate, fairly thick, 8 x 20 cm., conspicuously veined on both surfaces, and with somewhat prominent revolute margins, the midrib scarcely prominent; lateral veins rising at an angle of 35–40° to the midrib. The venation is irregular, in some leaves a few of the veins are somewhat longitudinal.

**Inflorescence** in axillary umbels or forming short panicles, or the umbels bifurcate and sometimes deflexed; peduncles slender, semi-terete, up to 12 mm. long. Buds pedicellate, up to fifteen in the umbel, cylindroid-rostrate. Calyx-tube urceolate to campanulate, the rim slightly reflexed, 4–5 x 3 mm.; operculum rostrate, up to 6 mm. long. Filaments white, all antheriferous. Anthers small, reniform; style subulate, rather long.

**Fruit** pedicellate, urceolate, with a short, or elongated narrow neck, 7–9 x 6–7 mm., valves usually deeply enclosed. The distinctly urceolate fruits readily separate it from its congeners.

**Timber** pale pink, moderately light and fissile, and somewhat similar in texture to the timber of *E. Sieberiana*. It planes well and should make excellent furniture. According to Mr. A. Murphy, it is considered a good timber for heavy work and is used for sleepers

In Part X, p. 302, attention is drawn to the urceolate fruits as follows:—  
“Messmate.” Wood of a yellowish colour; when fresh much inclined to ring. Urceolate, shape of fruit very pronounced, reminding one a good deal of those of *E. trachyphloia*, from which it differs in almost every other respect. See fig. 8, Plate 45, Wingello (J. L. Boorman). The type. The reference to fig. 8, Plate 45, is an error, fig. 6 was intended. Fig. 8 is discussed at p. 304, and is again referred to in the Explanation of Plates, p. 345.

## RANGE.

So far it appears to be confined to the Wingello, Mittagong, and Moss Vale districts, New South Wales. Paddy's River, Wingello (J. L. Boorman). "Trees 40-80 feet high and 4 feet in diameter; timber used in the mills for battens, palings and building purposes." A co-type. (A. and P. Murphy). "Large trees, timber pale pink, used for milling purposes." Cut-away Hill, off Sandy Flat, Mittagong district (D. W. C. Shiress). Co-type. Belmore Falls, Moss Vale (W. Forsyth, October, 1900). Burrawang (H. Deane).

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## AFFINITIES.

### 1. With *E. Bottii* Blakely.

Both species are moderately large trees, producing a light-coloured serviceable timber, but the timber of *E. urceolaris* appears to be superior to that of *E. Bottii*. On botanical characters the former may be readily distinguished from the latter by its urceolate buds and fruits. The venation of the leaves is also different.

### 2. With *E. piperita* Sm.

*E. urceolaris* is a superior tree in every way to *E. piperita*, and it also differs from it in the shape of the buds and fruits, as well as in the juvenile and adult leaves.



## DESCRIPTION.

CCCLXXXIX. *E. Callanii* Blakely.

In *Proc. Roy. Soc. N.S.W.*, lxi, 1927, p. 160.

STRINGYBARK *gracilis*, 20–50 pedes alta; folia juvenilia lata, oblique-ovata, breviter, petiolata, venulosa; folia matura nitida, angusta vel lato-lanceolata, venulosa; gemmæ ovoido-clavata, operculo conico, tubo calycis obconico; antheræ reniformes; capsulæ pedicellatæ, hemisphæricæ, 5 x 5 mm., valvis brevissimis deltoideis in apertura inclusis.

A slender Stringybark, 20–50 feet high; juvenile leaves broad, obliquely-ovate, shortly petiolate, venulose; adult leaves glossy, narrow to broad-lanceolate, venulose; buds ovoid-clavate, operculum conical, calyx-tube obconical; anthers reniform; fruit pedicellate, hemispherical, 5 x 5 mm., the very short deltoid valves enclosed in the orifice

A slender Stringybark, with a rather flat, flaky-fibrous bark on the trunk, and a moderately smooth bark on the branches.

**Juvenile leaves** not seen in the very earliest stage, glabrous, and not stellate-hairy as in *E. eugenioides*, obliquely ovate, shortly petiolate, coriaceous, light green and somewhat rough, with prominent veins and veinlets, 4–8 cm. long, 2.5–5 cm. broad, lateral veins somewhat irregular and bifurcate, diverging at an angle of about 50–60° with the midrib. Intramarginal vein undulate and usually distant from the edge.

**Intermediate leaves** alternate, broad-lanceolate to obliquely lanceolate on rather slender, channelled petioles, 6–16 cm. long, 3–5 cm. broad. Venation prominently raised on the lower surface, the lateral veins few and distant, the lower veins usually somewhat semi-longitudinal and sometimes uniting with the intramarginal vein about half-way up the lamina, diverging at an angle of 20–30° with the midrib; intramarginal vein 3–5 mm. from the edge, the intervening space usually strengthened by a secondary marginal nerve.

**Adult leaves** alternate, petiolate, lanceolate, aequilateral or nearly so, slightly viscid and glossy on both surfaces, rather flat, 4–15 cm. long, 1–3.5 cm. broad, distinctly veined on the lower surface, obscurely veined on the upper; lateral veins radiating at an angle of 10–20° with the midrib. Petioles slender moderately long and usually twisted.

**Inflorescence** in small axillary umbels, the common peduncle subterete, 8–12 mm. long, supporting 5–12 shortly pedicellate flowers. Buds ovoid-clavate, acute or the operculum acutely conical, 5 mm. long; calyx-tube short, obconical. Anthers reniform, the short filament adnate at the base, the broad cells crowned with a large globular gland.

**Fruit** pedicellate, hemispherical to copular, the disc flat or slightly convex, darker than the calycine portion, 3 or 4 celled, 5 x 5 mm. or sometimes larger, the very short deltoid valves scarcely exsert. Timber white, inclining to be gummy, fissile.

I have pleasure in associating this uncommon species with the name of Mr. and Mrs. Albert Philip Callan, of "Grantham," Mittagong, whose kind hospitality led to its discovery, as also to another new species,

## RANGE.

Up to the present it has been collected between Mittagong and Wombeyan Caves, and at Marrangaroo, New South Wales. The following are the definite localities :—

Back of Chalybeate Spring, near the Gib, Mittagong (D. W. C. Shiress, January, 1922).

Bowral-Berrima road, about  $3\frac{1}{2}$  miles from Mittagong (same collector, April, 1920).

Bowral-Wombeyan Caves road, near the junction of the old Mittagong and Joadja roads (D.W.C.S., April, 1922). In April, 1923, I visited the same locality accompanied by Mr. Shiress and obtained specimens, which constitute the type. The trees were growing in poor white pipeclay-like soil, and resembled *E. eugenioides* in general appearance except that the bark is flatter and in broad strips, extending nearly to the branches, and not rough and fibrous throughout like *E. eugenioides*.

One mile west of Wingello, small patches on poor clay soil (W. Murphy, August, 1924).

“Three miles south of Marulan on the side of a gravelly ridge. Bark smooth except on trunk, black flaky bark.” (Andrew Murphy, March, 1905.)

Eighteen miles from Wombeyan Caves, Bullio to Wombeyan (J. H. Maiden, October, 1905).

Marrangaroo, 102 miles west of Sydney (Dr. E. C. Chisholm, October, 1922). The leaves and buds are identical with those of *E. Callanii*, but the bark appears to be less fibrous, except at the base. It is a young tree, and therefore the bark is not mature.

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## AFFINITIES.

### 1. With *E. Laseroni* R. T. Baker.

Both species are small Stringybarks with almost the same cortical characters, but the branches of *E. Laseroni* are usually smooth and gum-like, and the leaves are broader and have a different venation to those of *E. Callanii*. There are also essential distinctions in the buds and fruits of both species. The half developed buds of *E. Laseroni* are narrower and more stellate, and when mature are more clavate than the buds of *E. Callanii*. The fruits of the former are more depressed than the fruits of the latter, while the timber of *E. Laseroni* is yellowish-brown, that of *E. Callanii* white.

Geographically the species are widely separated. *E. Laseroni* is found nearly 400 miles north of Sydney, and it appears to prefer a better class of soil to *E. Callanii*.

2. With *E. eugenoides* Sieb.

*E. Callanii* is a smaller tree than the typical *E. eugenoides*, and it has a more compressed flaky-fibrous bark on the trunk only, which does not stand out in longitudinal ridges like the bark of *E. eugenoides*. The timber is also dissimilar and inferior to that of *E. eugenoides*. The buds and fruits of both species are, however, almost identical, but there is considerable diversity between the juvenile leaves of both species. Those of *E. eugenoides* are narrow, crinkled and stellate, whilst the juvenile leaves of *E. Callanii* are broad and comparatively smooth.

3. With *E. vitrea* R. T. Baker.

The similarity of these trees is chiefly in the venation of their leaves, but the lateral veins of *E. vitrea* are even more longitudinal than those of *E. Callanii*. The floral organs, bark, and juvenile leaves, of course, sharply separate them.

The "Critical Revision of the Genus *Eucalyptus*" was commenced by the late J. H. Maiden in 1903. At the time of his death there were still several parts to be published—concerning some species he had left full notes, concerning others he had left fragmentary notes only, while other species which had not been described, had, in some cases, been under discussion with one or both of us. In editing those parts of the "Revision" unpublished at the time of Mr. Maiden's death we have, in accordance with his wishes, and in order to make the whole work as complete as possible, included species not described during Mr. Maiden's lifetime.

## DESCRIPTION.

### CCCXC. *E. pachycalyx* Maiden and Blakely, n.sp.

GUM tree parva; cortice levi, *E. maculata* similii; foliis maturis lanceolato-falcatis, crassiusculis et obscuris, venis obscuris, 6-12 cm. longis,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  cm. latis; alabastris pedicellatis, cylindraceis vel concideis; operculo calyce crasso levi longiore; antheris latis oblongis (Platyantheræ), loculis latis, lateralibus glandula parva, terminale; fructu non viso.

A small Gum tree, with a smooth, spotted bark like that of *E. maculata*.

Juvenile leaves not seen.

Mature leaves alternate, on long slender petioles, narrow-lanceolate to falcate-lanceolate, or somewhat acuminate, 6-12 cm. long, 1-2.5 cm. broad, with a very fine and obscure venation; lateral veins diverging at an angle of 35-40° to the midrib, intramarginal vein confluent with the margin.

Inflorescence in axillary umbels of 5-7 pedicellate flowers. Buds moderately large, cylindrical to conoidal, 10-11 x 6 mm.; operculum concial, longer than the smooth, thick calyx. Anthers broadly oblong, adnate at the base and terminating in a small terminal gland. Fruit not seen.

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## RANGE.

"A kind of Spotted Gum growing on the ranges at the back of Cairns, Queensland. Stunted trees, bluish bark with black spots." (H. W. Mocatta, No. 13, December, 1915). This is the only locality known to us.

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## AFFINITIES.

### 1. With *E. oleosa* F.v.M.

It resembles this species mainly in the anthers, which belong to Section Platyantherae.

### 2. With *E. leptophleba* F.v.M.

The anthers of both species are somewhat alike, but those of *E. pachycalyx* are somewhat broader than those of *E. leptophleba* F.v.M. The leaves of the former and also the buds are different from those of the latter.

### 3. With *E. Bowmani* F.v.M.

This is also indigenous to tropical Queensland, and up to the present is imperfectly known, but it appears to have broader leaves and different shaped anthers to those of *E. pachycalyx*.

## DESCRIPTION.

### CCCXCI. *E. subviridis* Maiden and Blakely, n.sp.

**ARBOR** mediocris; cortice crasso, fibroso in trunco; ramulis levibus; foliis junioribus ovatis vel lato-lanceolatis, subviridibus; foliis maturis subviridibus, oblongo-lanceolatis; alabastris ovoideis, levibus, pedicellatis, 3-7 in umbella; fructu globoso; valvis exsertis, 7-9 x 8-10 mm.

A medium-sized tree; bark thick, matted-fibrous on trunk, smooth on branches.

**Juvenile leaves** only seen in the alternate stage, shortly petiolate, ovate to broad-lanceolate, subviridis, thin, slightly undulate, 4-8 x 3-5 cm.; venation somewhat prominent on both sides; lateral veins diverging at an angle of 40-50° to the midrib, intramarginal vein distant from the edge.

**Intermediate leaves** alternate, shortly petiolate, lanceolate to broadly and obliquely lanceolate, undulate, somewhat thick, subglaucous, 8-13 x 4-8 cm.; venation conspicuous; lateral veins very irregular and often furcate, radiating at an angle of 50-55° to the midrib; intramarginal vein sometimes 5 mm. from the margin.

**Mature leaves** alternate, petiolate, oblong to narrow-lanceolate, with a more obscure venation than the juvenile and intermediate leaves, diverging at an angle of 40-50° to the midrib; intramarginal vein somewhat distant from the edge.

**Inflorescence** usually in axillary umbels of 3-7, shortly pedicellate, medium-sized flowers on short peduncles. Buds pedicellate, ovoid, smooth, scarcely acute, 7-8 x 5-6 mm. Calyx somewhat broadly campanulate, very shallow; operculum broadly conoid, 3-4 mm. long; filaments white, not very numerous; anthers rather large, versatile, with broad parallel cells and a large dorsal gland.

**Fruit** pedicellate, somewhat globose to pilular, 7-9 x 8-10 mm.; disc rather prominent, with a distinct calycine ring and shortly exsert valves.

**Timber** reddish, soft and gummy, inferior to its congeners.

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## RANGE.

So far it has only been found near the Pound Yard at Marulan, and along Jounama Creek, half a mile from Marulan, New South Wales (A. and P. Murphy, December, 1921).

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## AFFINITIES.

### 1. With *E. cinerea* F.v.M.

It has the cortical characters of *E. cinerea*, but the foliage is greener, the buds are more numerous and not angular or acute, while the fruits are larger, more globular, and more numerous in the head. The seedlings of *E. subviridis* are slightly broader and greener, with reddish stem, than those of the typical *E. cinerea*.

### 2. With *E. cinerea* F.v.M. var. *multiflora* Maiden.

The trees are much alike in the field, but the greener foliage of *E. subviridis* is readily distinguished from that of var. *multiflora*, which is decidedly more glaucous. The buds and fruits of the former are larger and of a different shape to those of the latter.

## DESCRIPTION.

*CCCXCII.* × *E. McClatchie* Kinney.

Described in "Eucalyptus." p. 188 (1895) by Abbott Kinney, Los Angeles, California, U.S.A. (with one half-tone photograph).

LEAVES long-stalked, scattered, lanceolar or sickle-shaped, rather narrow, equally dull green; umbels solitary, axillary; stalk compressed, about as long as calyx-tube, stalklets short; calyx-tube truncate with two edges and tendency to be somewhat flattened or a little out of a true circle; buds very angular, ridges showing almost as wings; lid hemispheric, acuminate, central point of lid blunt and prominent valves enclosed, bark sheds in long strips; general appearance of tree suggests *Eucalyptus globulus* or *Eucalyptus goniocalyx*; anthers oblong, dorsal gland prominent; stamens all fertile, inflexed in bud; stigma not or scarcely broader than style.

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## RANGE.

Los Angeles, California (Abbott Kinney, 28th December, 1903). It is not known whether this tree is still in existence.

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## AFFINITIES.

### 1. With *E. Mortoniana* Kinney.

The buds of *McClatchie* have longer pedicels and shorter operculum than those of *E. Mortoniana*. The common peduncle of the former is longer and thinner than that of the latter.

### 2. With *E. pseudo-globulus* (Hort.) Naudin.

*E. McClatchie* is somewhat like *E. pseudo-globulus* in the leaves, but differs from it in the shape of the operculum and in the fruit. It is perhaps nearer to this species than any other known to me.

## DESCRIPTION.

CCCXCIII.  $\times$  *E. Mortoniana* Kinney.

Described in "Eucalyptus," p. 192 (1895), by Abbott Kinney,  
Los Angeles, California, U.S.A.

LEAVES long-stalked, scattered, lanceolar or sickle-shaped, long and rather broad; equally dull green; stalk compressed; about the length of calyx-tube; stalklet distinct; calyx-tube rough, often slightly ridged, top-shaped or truncate-ovate; border of a tube has the appearance of a pot of some thick fluid boiling over; lid hemispheric-acuminate, the point or beak of the lid is thick and long; buds flattened and angular; valves exerted, generally four, or rarely three; bark sheds in long strips. General appearance suggests *E. globulus*; anthers oblong, opening by parallel slits, dorsal gland prominent, style spotted, somewhat dilated towards top, stigma not dilated.

Grown at Los Angeles, California, U.S.A. It is No. 237,908 in the United States National Herbarium. I have figured leaf, bud and fruits in Part XVIII, Plate 80, fig. 8.

In the above part, p. 256, I have placed it as a synonym of *E. Maidenii*, and I regarded it as one of the large-fruited forms of that species. I now think it is distinct from *E. Maidenii*, and it seems to me to be more closely allied to *E. McClatchie* and *E. pseudo-globulus* than to *E. Maidenii*.

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RANGE.

Besides the Los Angeles locality quoted above, I have received two specimens from Miss Alice Eastwood, collected by herself and Eric Walther from Golden Gate Park, San Francisco, July, 1921, and February, 1922, which appear to be as near the type of *E. Mortoniana* as we are likely to get. Miss Eastwood in a letter to me refers to this species as follows:—"We had a specimen of *E. Mortoniana* sent us in a collection made at the Forestry Station in Santa Monica (? the original tree of *E. Mortoniana*, J.H.M.), and I have identified two trees in Golden Gate Park by means of it. The two trees grow close together and are tall and handsome in general appearance, like *E. globulus* for which they might be mistaken. The bark, especially at the base of the trunk, is more persistent, and the young stems are brown instead of pale grey as in *E. globulus*. The seedling leaves are not known."

Under *E. Cordieri* Trabut, Part LII, Plate 213, figs. 3a and 3b, buds and fruit of this species are depicted, and were attributed to *E. Cordieri* by mistake. They are from No. 237, Herb. d'Algerie (Dr. Trabut), and were collected by M. Cordier, who determined it as a hybrid of *E. globulus*. Dr. Trabut wrote across the label " $\times$  *Eucalyptus Cordieri*, prob." thus indicating that he was uncertain of the determination.

## AFFINITIES.

1. With *E. McClatchie* Kinney and *E. pseudo-globulus* (Hort.) Naudin *see* pp. 17 and 28.

2. With *E. bicostata* Maiden, Blakely and Simmonds..

It seems to have the cortical characters of this species, but the buds and fruits are quite different. They are strictly sessile in *E. bicostata*, and vary considerably in shape and thickness from those of *E. Mortoniana*.

3. With *E. unialata* Baker and Smith.

*E. Mortoniana* appears to be closely allied to *E. unialata* in the buds and fruits, and also in the mature leaves, but the former characters have longer pedicels and the fruits are a size larger.



## DESCRIPTION.

CCCXCIV. *E. Dixsoni* Wakefield, n.sp.

ARBOR parva 30-50 pedes alta; cortice persistente, fibroso usque ad ramos parvos; foliis junioribus heteromorphis, oppositis pallido-viridibus vel glaucis, angusto vel lato-lanceolatis; foliis maturis gracilibus, clavatis, operculo obtuso; fructu campanulato vel cupulare, 7 x 6 cm.

"Usually a small tree, rarely exceeding 50 feet in height and 2 feet in diameter at the butt; the bark persistent to the finer branchlets; the texture of the bark is fibrous, being almost intermediate between the Peppermint type and the Stringybark type.

**Leaves** heteromorphic; mature leaves lanceolate-falcate, disposed vertically and drooping from the branchlets; intermediate leaves lanceolate, and some pale glaucous. Sucker leaves, two distinct forms to be found on the one plant—a small form very similar to the sucker leaves of *E. radiata*, but more ovate and pale green, not glaucous; the larger form closely resembles the suckers of *E. dives*, white glaucous, sessile and opposite, but usually more acutely acuminate ovate.

**Fruit** resemble *E. dives*, in clusters of six to fifteen.

"**Range.**—Found in the Yambulla district, and specimens from which the type is described were collected 3½ miles east from Yambulla Mountain, where a belt of considerable size is to be found.

"It is found in ecological association with *E. Consideniana* and *E. eugenoides*. There can be little doubt of its origin, as *E. radiata* x *E. Consideniana*, both of which occur widely distributed in the district. Occasional trees have also been observed near Timbilica and Yambulla and along the South Coast, south from Moruya, and it is probable, therefore, that its range may be considerably extended.

"The most remarkable feature is the great diversity of form exhibited in the sucker leaves. A clump of suckers at the butt of the tree will usually be found to have the large glaucous leaves approaching *E. dives*. Suckers produced from adventitious buds higher, as the result of fire or other accident, are usually closely approaching *E. radiata*. Suckers about midway in character are also to be found. (The intermediate-leaved stage in nearly all species is very interesting.—J.H.M.)

"**Heteromorphic Leaves and Ancestral Characters.**—There appears to be considerable evidence in support of the view that 'suckers' produced from adventitious buds exhibit characters approximating the ancestral form of the species. In the development of an individual from such adventitious buds there appears to some degree to be a recapitulation of phylogeny. How far such characters may be justly so interpreted, and how far such forms are evidence of adaptations to new environmental conditions it is difficult to estimate.

"The development of adventitious buds in the case of *E. Dixsoni* is of considerable interest from this point of view. The adult species is perhaps more closely allied to *E. Consideniana* than to any other species. Only on very close examination of the bark is it possible to discriminate between the two species in the absence of leaves and fruits. These latter indicate affinities with *E. radiata*, and the leaves are almost intermediate in character. There can be little doubt that the new species is a product of these two widely different species.

"A study of the development of 'suckers' from an adventitious bud in *E. Dixsoni* is most instructive. The young shoots develop thin green lanceolate leaves almost identical with those of *E. radiata*, thus indicating its phylogenetic relationship. Such suckers may persist for some time, and several have been measured exceeding 2 feet in length. Eventually, however, these delicate green leaves are replaced by large, coarse, glaucous leaves, very similar to the familiar sucker leaves of *E. dives*. Indeed, when the species was first observed the following note was made on the spot:—'A belt of a curious form exhibiting relationships with *E. Consideniana* and *E. dives* occurs about 1 mile north from the eastern end of Captain's Swamp.' Subsequent examination, however, clearly indicated its relationship with *E. radiata* and not with *E. dives*, as the secondary suckers would suggest.

"Now the delicate green primary suckers are to be regarded as indicating the true phylogenetic relationship, whilst the coarse, glaucous secondary suckers suggest an adaptation of such sucker growth, by the development of xerophytic structure, to environmental conditions unsuitable for the existence of thin green leaves of the *E. Dixsoni* type. The distribution of *E. Dixsoni* seems to be determined by its water requirements, and that it is restricted to zones of critical soil humidity. *E. Dixsoni* is found at higher altitudes on drier soils. The conclusion, therefore, that the *E. dives*-like sucker is but a structural adaptation in response to the impress of more xerophytic conditions seems not unreasonable."

Named in honor of the late Sir Hugh Dixon, Abergeldie, Ashfield, New South Wales. (End of Mr. Wakefield's remarks.)

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## AFFINITIES.

Besides the affinities already discussed by Mr. Wakefield, it appears to me (W.F.B.) that *E. Robertsoni* bears a rather close relationship to *E. Dixsoni* in the shape and colour of the juvenile and adult leaves, and also in the shape of the buds and fruits. The latter characters are so much alike that it is sometimes difficult to discriminate between them. The much broader juvenile leaves of *E. Dixsoni*, however, separate it from *E. Robertsoni*. The arboreal characters of both species are also dissimilar, and also the timbers. *E. Dixsoni* may be regarded as a far inferior timber tree to *E. Robertsoni*.

With *E. dives* Schauer.

It is quite obvious that *E. Dixsoni* is more closely allied to *E. dives* in all its botanical characters than to any other species, and in imperfect specimens one would say they are conspecific. It is interesting to note, also, according to Mr. Wakefield, that the oil of *E. Dixsoni* is nearly of the same constituent as that of *E. dives*. It contains a large quantity of phellandrene. And, on the other hand, according to the same authority there are no plants of *E. dives* associated with *E. Dixsoni*.

With *E. radiata* Sieb. var. *latifolia* Baker.

I have not had the opportunity of closely examining this variety, and from the very imperfect description it would appear to be closely allied to it in the broad leaves, in fact, it may be conspecific with it.

## DESCRIPTION.

*XCVIII. E. globulus* Labill.

Investigations have shown that this is a very composite species so far as the Victorian and New South Wales plants are concerned, which should never have been united with the Tasmanian plant.

For a number of years I have been puzzled with what I regarded as transit forms between *E. globulus* and *E. Maidenii*, and often discussed them with my assistant, Mr. W. F. Blakely, and referred to them as the *E. globulus*-*E. Maidenii* puzzle. And in 1921-22 we critically examined the whole of the material of both species in the National Herbarium as well as the fruiting specimens in the Melbourne Herbarium. The results of our investigations will be seen presently, as also those of the Rev. J. H. Simmonds of New Zealand. It is mainly due to the latter gentlemen's close association with the cultivated forms of *E. globulus* in New Zealand that led to the discovery that the Tasmanian and Mainland trees were distinct species.

In Part XVIII, p. 249, of the present work, *E. globulus* is fully described and figured at Plate 79, whilst in Part LXV, p. 218, the juvenile leaves were described, which were omitted from the former part.

In Part XVIII, Plate 79, the following figures are referable to *E. globulus* :—

1. Juvenile leaf (Coll. Labillardiere, in Herb., Kew). (Tasmania.)
- 2*a*. Juvenile leaf; 2*b*, mature leaf. Adventure Bay, Tasmania (J.H.M.).
3. Bud. Hobart, Tasmania (L. Rodway).
- 4*a*. Front and back view of anther; 4*b*, typical form of ripe fruits. Port Arthur, Tasmania (J.H.M.).
- 5*a*. Bud; 5*b*, fruit (R. Gunn, Flinders' Island, 1842, No. 1070).

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RANGE.

It seems to be confined to Tasmania and Flinders' Island. The Victorian and New South Wales references to its range in Part XVIII, p. 251, are mainly referable to *E. bicostata*.

Var. *compacta*, n. var.

**Juvenile leaves** the same as in *E. globulus* in shape, but smaller.

**Mature leaves** alternate, lanceolate to falcate-lanceolate, dark green to slightly glaucous, 10 to above 20 cm. long, 1-3 or more cm. broad; venation the same as in the species.

**Buds** glaucous, single or in pairs, occasionally the well-developed peduncle supporting three closely sessile, broadly turbinate to almost hemispherical, glandular-warty, buds; operculum rather small, abruptly apiculate, and, like the calyx-tube, tuberculate.

**Fruit** not seen in a fully ripe state; hemispherical with a rather prominent disc and somewhat deeply sunk valves, usually bicostate, 13 x 15 mm., but when fully developed much larger.

The fruit on the whole is much smoother than that of *E. globulus*, and it is not unlike the fruit of *E. bicostata*, except that it appears broader at the base, but it may even be found to be narrow-turbinate in fully developed specimens.

The name var. *compacta* appears in list of *Eucalyptus* cultivated in America, but it does not appear to have been described.

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RANGE.

The only specimens I have seen are those from Golden Gate Park, San Francisco (Miss Alice Eastwood, July, 1921).

## DESCRIPTION.

CCCXCV. *E. bicostata* Maiden, Blakely and Simmonds.

In Trees from other Lands in New Zealand, *Eucalypts*, by J. H. Simmonds (1927) p. 133, Botanic Plate, 48, Figs. A, B, C, F, G.

ARBOR altitudinem usque ad 150 pedes attingens. Cortice laevo atque nonnihil glauco; non autem persistente sed inaequaliter decedente. Foliis juvenilibus magnis, insigniter glaucis, in diversum positis, sessilibusque. Foliis adultis et lanceolatis et falcatis, saepe viridissimis, nonnunquam longissimis. Umbellis plerumque tripartitis; calycibus sessilibus et rugosis. Fructibus turbinatis vel globosis; valde bicostatis. Matura cupula amplitudine circiter 12-17 x 14-20 mm. Fructus disco convexo latoque. Ligno pallido, firmo, durabili.

A Blue Gum, 40-150 feet high; bark smooth, decorticating annually in thin strips or flakes; juvenile leaves large, very glaucous, opposite, sessile, ovate-cordate to oblong-lanceolate; adult leaves green; falcate-lanceolate, 1-7 dm. long; buds sessile, usually in three, warty-glandular, bicostate, subtended by broad, thin, connate, deciduous bracts; fruit turbinate to globular, with a conspicuous thick disc, 12-17 x 14-20 mm.; timber pale-coloured, close-grained, hard and durable.

A moderately large tree with the general appearance of *E. globulus* and *E. Maidenii*. The bark persists on the lower portion of the trunk of large trees for a short distance, and is usually very rough, dark grey or brown, coarse-fibred, the upper portion and branches smooth, blue-green, shading to grey-green, or rarely of a uniform colour, except perhaps when the old bark peels off during the flowering season. Juvenile leaves similar to those of *E. globulus*; adult leaves light to dark-green, pendent, usually falcate-lanceolate, on long petioles 4-28 inches long. See figure of the leaves of *E. globulus*, Critical Revision, Part XVIII, Plate 79, figs. 1a, 2a, 2b. Buds 1-3, usually 3, axillary, glaucous, sessile, on a very short peduncle, or the peduncle totally obliterated, bicostate, or the calyx of the two lateral buds convexed on the outer surface, smooth or usually more or less warty-glandular, 7-13 mm. long, 6-12 mm. broad at the top. Operculum thick, depressed hemispherical to somewhat-cap-shaped, usually very warty, gradually or abruptly pointed or sometimes rostrate, and when the latter much longer than the calyx-tube. Bracts deciduous, but sometimes remaining attached until the buds develop, thin, connate, broad, and obtuse, rarely as long as the calyx-tube. Mueller appears to have been the first to observe the bracts and they are figured by him in the "Eucalyptographia".

Fruit turbinate to globular, sessile, bicostate, usually slightly warty between the ribs, 4-5 celled, the rim broad, moderately smooth and thick, sometimes concealing the short, thick valves. The fruits are depicted on Plate 79, figs. 6, 8, 9a, 9b, 9c, 12, all of which are unripe, and therefore immature; dead ripe and mature fruits were not available at the time.

*Timber*.—In the southern districts of New South Wales it is known as "Eurabbie" and is a tall tree, 40-80 feet high, with thick straight stems 20-40 feet to the first branch. The timber is pale-coloured, is valued highly and largely used in tail-races for mining purposes, also for bridge decking and girders when well seasoned. It is tough and valuable for coach and cabinet material; it also makes excellent fuel.

Specimens from Mundaroo State Forest, Tumbarumba district, New South Wales (W. A. W. de Beuzeville) constitute the type. They are almost identical with specimens from Burrinjuck (J. L. Boorman, R. H. Cambage), which may be regarded as co-types. They are not unlike some specimens from Jenolan Caves (W. F. Blakely) and one from Parish of Otway, Victoria, at an elevation of 500 feet, 1 mile from the sea (A.V. Galbraith). The fruits of the latter are more fully developed than any of the above specimens, and are slightly larger and more globular. In the majority of specimens that have been examined, the so-called small fruited forms are really fruits which have not reached maturity.

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## SYNONYM.

*E. globulus* F.v.M., Benth., and others, non Labill.

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## RANGE.

So far it appears to be confined to the coastal and cool mountain districts of New South Wales and Victoria.

In New South Wales it is common on the Upper Murray and Tumut Rivers, and in the counties of Selwyn, Wynyard, Buccleuch, and Cowley generally. Further north, it occurs at Burrinjuck, Jenolan Caves, &c. Going still further north, it is found on Nulla Mountain, Rylstone (Mudgee) districts, and in New England (Nundle and Walcha districts).

In Victoria it is confined chiefly to Gippsland, and is said to reach a height of at least 200 feet.

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## AFFINITIES.

### 1. With *E. globulus* Labill.

It is closely allied to *E. globulus*, with which it had been confused for many years, and from which it differs in the more numerous and smaller flowers in the head, smaller and usually two-ribbed fruits, and in the semi-persistent floral bracts. In *E. globulus* the buds are usually solitary, large and four-ribbed or four-angled and very warty. The fruits are also four-ribbed, and sometimes with smaller ribs between the prominent ones. There does not appear to be any essential difference between the juvenile and adult leaves of both species, and in a young state the plants are very similar. *E. bicostata* does not appear to be as adaptable as *E. globulus*, and is unable to make the same rate of growth under cultivation as *E. globulus*. Its timber is also inferior to that of the last-named species.

2. With *E. Maideni* F.v.M.

It resembles this species mainly in cortical characters, and in the juvenile leaves and timber.

3. With *E. paradoxa* Maiden and Blakely.

There appears to be but little difference between the bark, juvenile leaves and timber of *E. paradoxa* and *E. bicostata*, but the buds and fruits of the former are more numerous in the head and the pedicels are well developed. The fruit is also larger.

## DESCRIPTION.

CCCXCVI. *E. St. Johni* R. T. Baker.

*Journ. Aust. Assoc. Adv. Science*, xiv (January, 1913); *Vict. Nat.*, xxx, 127  
(November, 1913).

The description is also given in Part XLVIII, p. 240 of the present work, and need not be repeated. The fruits are depicted on Plate 79, fig. 10, the type. Figs. 7a, 7b, are also referable to *E. St. Johni*. The fruits of both specimens are almost smooth, or with a very faint rib. In the above Part it was discussed as a synonym of *E. globulus*, but it has since been found to be distinct from that species.

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## RANGE.

It is confined to Victoria, so far as we know at present. On the banks of the Lerderberg River, Bacchus Marsh district, 5th November, 1903 (P. R. H. St. John). The type. Toongabbie (H. Hopkins, May, 1911).

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## AFFINITIES.

1. With *E. bicostata* Maiden, Blakely and Simmonds.

It is a smaller and inferior tree to *E. bicostata*, but much field work is required to work out the affinities of both species. It is however, readily separated from *E. bicostata* by the much smaller buds and fruits, and also by the longer common peduncle.

2. With *E. globulus* Labill.

Its affinity with *E. globulus* is discussed in the original description, *vide* Part XLVIII, p. 240.



## DESCRIPTION.

*CCXCVIII. × E. pseudo-globulus* (Hort.), Naudin.

For a brief description and figure see Part LII, p. 78, Plate 214, fig. 6.

On p. 106 of the above Part I stated :—" It is an undoubted hybrid, but has apparently not yet been formally described." Having satisfied myself that it is a natural hybrid, I now proceed to describe it more fully.

A medium-sized Gum tree, with the general appearance of *E. globulus* or *E. bicostata*. Bark smooth and blotched, except for a few feet at the base of the trunk; branches smooth, but sometimes with a few ribbony flakes of dead bark adhering to them; branchlets angular.

**Juvenile leaves** glaucous, particularly on the lower surface, opposite for an indefinite number of pairs, ovate to lanceolate, apiculate or acute, sessile to stem-clasping, or somewhat similar to those of *E. globulus*, 6-10 cm. long, 3-5 cm. broad; venation obscure, the lateral veins rather fine and distant, diverging at an angle of 60-70° with the midrib; intramarginal vein distant from the minutely subcrenulated margin. Internodes quadrangular, glaucous.

**Intermediate leaves** opposite to alternate, sessile to shortly petiolate, oblong to oblong-lanceolate, apiculate to acuminate, very glaucous on the lower surface, and usually of a dark-green colour on the upper surface, 10-16 cm. x 6-10 cm.; venation somewhat distant and more or less distinct, the lateral veins very irregular and much branched upwards, usually diverging at an angle of 50-60° with the midrib; intramarginal vein distant from the edge. Internodes quadrangular, glaucous.

**Mature leaves** alternate, lanceolate to falcate-lanceolate, usually acuminate, 10-35 cm. long, 2-5 cm. broad, or broader; venation moderately distinct, the lateral veins rather fine, radiating at an angle of 35-40° with the midrib; intramarginal veins usually distant from the margin.

**Inflorescence** in axillary triads, the common peduncle compressed 10-12 mm. long, 5 mm. broad at the top, bearing three moderately large pedicellate flowers. Buds clavate, slightly angular, subglaucous, the short, verrucose operculum umbonate to apiculate. Calyx turbinate, tri or quadrangular, smooth, usually longer than the operculum; filaments white; anthers versatile, the cells rather long and with a large dorsal gland. Pedicels usually quadrangular, as long as or longer than the calyx-tube.

**Fruit** pedicellate, turbinate, moderately thick, smooth or with 1-2 short ribs, 10-12 mm. long and about as broad across the top; disc prominent, usually fused to the well exerted valves and often concealing them.

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## RANGE.

As already stated in Part LII, p. 78, this species was first noticed in Algiers and was regarded by Naudin as a hybrid of *E. globulus*. I am now convinced that it is a natural hybrid, and in the present state of our knowledge it appears to be confined to Metung, Victoria, and was collected by Dr. A. W. Howitt, January, 1906; J.H.M., July 1908, and J. L. King, August, 1909. In Part XVIII, p. 258, I referred to the above specimens as aberrant forms of *E. Maidenii*. I have also received a cultivated specimen from New Zealand, collected by the Rev. J. H. Simmonds, which seems to come very close to this species, and at the same time it shows affinity to *E. McClatchie* Kinney.

## AFFINITIES.

### 1. With *E. Maideni* F.v.M.

The buds are warty, like those of *E. Maideni*, but they are invariably in threes, and larger than those of *E. Maideni*. The fruit is also larger, and it seems to be intermediate between the fruits of *E. Maideni* and *E. McClatchie*.

### 2. With *E. McClatchie* Kinney.

It differs from this species in the warty buds and larger fruits; it is also more glaucous than *E. McClatchie*.

### 3. With *E. Mortoniana* Kinney.

It seems to differ from *E. Mortoniana* in the longer pedicels, verrucose buds and different shaped fruits, particularly as regards the sculpture of the disc.

### 4. With *E. paradoxa* Maiden and Blakely.

It is readily distinguished from this species by the warty operculum and in the turbinate fruits. The buds of *E. paradoxa* are smooth and exceed more than three in the umbel, while the fruits are mallet-shaped.

### 5. With *E. bicostata* Maiden, Blakely and Simmonds.

It appears that both trees are somewhat alike as regards the bark, juvenile and mature leaves, but the buds and fruits of *E. pseudo-globulus* are conspicuously pedicellate, while those of *E. bicostata* are sessile; there is also marked variation in the shape of the buds and fruits of both species.

## DESCRIPTION.

### CCCXCVII. *E. paradoxa* Maiden and Blakely, n sp.

GUM altiuscula; cortice levi, maculoso praeter basin trunci; foliis junioribus glaucis, ovato vel lato-lanceolatis; foliis maturis atro-viridibus, falcato-lanceolatis; alabastris 3-7 in umbellis axillaribus, levibus; operculo lato-conico; fructu sub-globose; disco prominente; valvis crassis, exsertis, 10 x 11 mm.

A moderately large Gum tree; bark smooth, except at the base.

**Juvenile leaves** broad, glaucous, somewhat similar to those of *E. Maideni*.

**Adult leaves** lanceolate to falcate-lanceolate, coriaceous, with long petioles, 10 to over 20 cm. long, 1.5-5 cm. broad; venation distinct, the midrib raised on the lower surface, forming a shallow channel above; lateral veins very irregular, usually wavy or rarely straight, somewhat numerous, spreading at an angle of 35-45° with the midrib; intramarginal vein usually conspicuous and well removed from the margin, which gives the leaf a somewhat triplinerved appearance.

**Inflorescence** in axillary umbels of 3-7 pedicellate flowers, the centre one on longer pedicels than the lateral ones. Common peduncle compressed-angular, up to 20 mm. long, 3-4 mm. broad. Buds shortly clavate, acute, or the operculum sharply conical, minutely glandular-rugose, but not warty, 10-12 x 6 mm. Calyx goblet-shaped, thin, about the same length as the operculum; pedicels quadrangular 4-5 mm. long.

**Fruit** mallet-shaped to sub-globose, rather thick, pedicellate, 10 x 11 mm., the rim somewhat sharp and oblique, with a rather large capsular disc which extends nearly halfway over the strong, deltoid, slightly exsert, valves; the calycine portion smooth, or sometimes unicostate.

**Timber.**—"Has a yellowish, inclining to light-brown chip, very much like *E. globulus*" (J. L. King). Probably a good timber.

**Illustrations.**—Buds and fruits are depicted on Plate 80, figs. 10a, 10b, and 11, under *E. Maideni*.

## RANGE.

So far it is known only from Metung, Victoria. "A large tree, has a bark like *E. globulus* (*E. bicostata*), but not so light in colour, in fact it seems half way between *E. tereticornis* and *E. globulus*," Metung (J. L. King). Tree by the Waterhole at the 60 acres, Metung (A. W. Howitt).

## AFFINITIES.

1. With *E. Maideni* F.v.M., from which it differs in the shape of the buds, which are more angular with a sharp calycine rim.

The operculum is also conoid, not dome-shaped and apiculate and warty like *E. Maideni*. The fruit is also less truncate and more subglobose, and abruptly tapers into a long, quadrangular pedicel. It is also non-glaucous, except the juvenile leaves.

2. With *E. bicostata* Maiden, Blakely and Simmonds.

It seems to have almost the same habit and cortical characters as the above, but it is readily distinguished from it in the more numerous pedicellate buds and fruits, which also differ in size and shape, and they are non-glaucous.

2. With *E. oviformis* Maiden and Blakely.

It has the field characters of *E. oviformis*, and it also resembles it in the shape of the buds, but the fruits are distinct.

## DESCRIPTION.

CCCXCVIII. *E. oviformis* Maiden and Blakely, n.sp.

ARBOR altiuscula; cortice levi, maculoso; foliis maturis crassiusculis, prominente venosis, lato-lanceolatis; alabastris pedicellatis, 5-7 in umbella; operculo conico, calyce tubo longiore; fructu ovoideo, disco prominente, valvis exsertis, 12 x 11 mm.

A moderately large tree; bark smooth like *E. tereticornis*, but lighter and with reddish patches and black blotches. (J. L. King.)

**Juvenile leaves** not seen.

**Mature leaves** alternate, petiolate, rather thick, coriaceous, broad-lanceolate to falcate-lanceolate, acuminate, 7-20 x 2-3.5 cm.; venation somewhat distinct, rather fine and distant, diverging at an angle of 40-50° to the midrib; intramarginal vein distant from the edge.

**Inflorescence** in axillary umbels of 5-7 pedicellate, medium-sized flowers. Peduncle compressed, strap-shaped, broader at the top, up to 17 mm. long. Buds cylindrical, scarcely acute, 10 mm. long; operculum somewhat sharply conical to slightly rostrate, somewhat glandular-rugose, longer than the small, slightly angular, calyx-tube. Pedicels quadrangular, 5-7 mm. long. Anthers versatile, opening in long parallel slits, and with a large dorsal gland.

**Fruit** nearly ovoid or mallet-shaped, 12 x 11 mm., with a broad, thick disc extending well over the short exsert, deltoid, valves, and with a clearly defined calycine ring; the rather long pedicel more or less quadrangular.

**Timber** reddish, but not so deep a red as *E. tereticornis*. It appears to be close-grained, hard and interlocked.

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RANGE.

It is known only from Metung, Victoria (J. L. King, August, 1909). Only one tree observed by Mr. King. When I received the specimen I made the following note:—"I think a Eucalyptus hybrid in which probably the small-fruited *globulus* plays a part." In 1912 I was of the opinion that it was a transit form of *E. Maidenii*, and depicted it as such in *Crit. Rev.*, Part XVIII, Plate 80, figs. 12a, 12b. We now agree that it is more closely allied to *E. tereticornis* than any other species known to us, and that it may be a natural hybrid between *E. tereticornis* and *E. paradoxa*.

## AFFINITIES.

### 1. With *E. tereticornis* Sm.

It is closely allied to *E. tereticornis*, from which it may be distinguished by the lighter coloured timber, coarser peduncles, larger and different shaped glandular buds, and much larger ovoid fruits. It is very distinct from specimens of *E. tereticornis* from the same locality.

### 2. With *E. Maideni* F.v.M.

It has the cortical characters of *E. Maideni*, and also resembles it somewhat in the shape of the fruits.

### 3. With *E. paradoxa* Maiden and Blakely.

It resembles that species in cortical characters and to a limited extent in the buds and fruits. We have not seen the juvenile leaves of *E. oviformis*, and therefore cannot say whether they are glaucous or not.

## DESCRIPTION.

CCCXCIX. *E. niphophila* Maiden and Blakely, n.sp.

ARBOR parva alpina, vel arbustum, caulibus curvatus 3-20 pedes altis; cortex glaber, albus; ramuli per-glauci; folia juvenilia opposita vel alternantia, sessilia vel breviter petiolata, ovata vel orbicularia, pallide viridia, 2.3-4 x 1.5-2.5 cm.; folia matura alternata, petiolata, lanceolata, acuminata nonnuquam uncinata, crassa, coriacea, nitentia, 3-8 x 1.7-2.5 cm.; umbellae brevissimae, axillares, 3-7 floribus; gemmae valde glaucae, sessiles, clavatae, acutae, rugosae, 5-7 x 5 mm.; antherae reniformes; capsulae globosae vel turbinatae, truncatae, valde glaucae, 7-10 x 9-11 mm.

A small, crooked, alpine tree or mallee, with several whip-stick-like stems springing from a large woody rootstock, 3-20 feet high; bark usually smooth and white. Branchlets, inflorescence, and fruit very glaucous.

**Juvenile leaves** not seen in a fully developed state, the first two or three pairs opposite, sessile to very shortly petiolate, ovate to orbicular, apiculate, light green, not glaucous, 2-3.4 cm. long, 1.5-2.5 cm. broad. Venation very fine, distinct on both sides, the lateral veins often branched, diverging at an angle of 30-40° with the midrib, the secondary veins very numerous and reticulate, the intramarginal vein distant from the slightly revolute margin. Stems and internodes compressed reddish-brown, without any trace of glaucousness, the internodes up to 8 cm. long.

**Intermediate leaves** not seen.

**Mature leaves** alternate, petiolate, lanceolate to lanceolate-falcate, somewhat aequilateral with acuminate or uncinata points, thick, coriaceous, shining on both surfaces, 3-8 cm. long, 1.7-2.5 cm. broad. Venation somewhat longitudinal, distinct or sometimes totally obscure owing to the thickness of the leaves, the median nerve almost indistinguishable from the very fine lateral veins which sometimes extend the whole length of the leaf, but which usually diverge at an angle of 5-15° with the midrib; intramarginal vein usually close to the thick nerve-like margin. Petioles compressed-terete, glandular-rugose, up to 15 mm. long.

**Inflorescence** in short axillary umbels of 3-7 flowers. Peduncles rather thick, terete, usually much shorter than the buds. Buds very glaucous, sessile to very shortly pedicellate, clavate, with a somewhat acute, slightly rugose, operculum, 5-7 mm. long, 5 mm. in diameter. Calyx thick, broadly funnel-shaped, rather shallow, longer than the operculum. Filaments white, filiform, numerous, inflected, with perfect and rudimentary anthers. Anthers reniform, the broad, white, papery cells more or less lateral and terminating in a small gland. Style slender; stigma very small.

**Fruit** globose to turbinate, truncate, sessile or shortly pedicellate, usually very glaucous like the branchlets, glandular-rugose, the flat disc broad and thin, and usually partly concealing the very short enclosed valves, 7-10 mm. long, 9-11 mm. in diameter, invariably three-celled.

It is depicted in this work, Part V, Plate 26, fig. 6 (leaves and fruits), Plate 27, fig. 3 (juvenile leaves). All from Mount Kosciusko. There are also photographs of this species in "The Forest Flora of New South Wales," Part XV, Plate 58, facing pages 114 and 115, also a reproduction of fig. 6 above.

## SYNONYM.

*E. coriacea* A. Cunn. var. *alpina* F.v.M.

## RANGE.

It is common in the alpine regions of New South Wales and Victoria. It does not appear to extend into Tasmania.

*Victoria*.—Mount Hotham, Victorian Alps (J. H. Maiden); Buffalo Mountains (Mr. West, per C. Walter).

*New South Wales*.—Pretty Point, Mount Kosciusko, also at the "tree-line," about 6,500 feet elevation (J. H. Maiden and W. Forsyth, January, 1899). The type. Upper Cotter, Canberra, top of Bimberi Peak near Trig. Station, 6,264 feet, "the only Eucalypt on the summit, 10-20 feet high" (R. H. Cambage, No. 3470). "Small trees with a smooth bark and gnarled, bent and twisted stems," top of Mount Tabletop, about 6,000 feet (E. Betche, February, 1887).

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## AFFINITIES.

### 1. With *E. coriacea* A. Cunn.

It is readily separated from *E. coriacea* by the glaucousness of its characters, much smaller juvenile and adult leaves, fewer flowers in the umbels, and in the smaller fruits.

### 2. With *E. de Beuzevillei* Maiden.

This is another alpine species which displays glaucousness in the young shoots, buds, and fruits, but on the whole it is a much larger tree, while the buds and fruits are markedly more angular and coarser than those of *E. niphophila*.



## DESCRIPTION.

### *CD. E. congener* Maiden and Blakely, n.sp.

**ARBOR** recta 40–60' alta, cortice aspero in trunco, levi in ramis; foliis junioribus leniter glaucis, lanceolatis, foliis maturis alternatis, petiolatis, lanceolatis, acuminatis, nitentibus; venis obscuris; inflorescentia in umbellis axillaribus 7–12 floris; alabastris gracilibus, conoideo-clavatis; operculo conico calycis tubo brevioris; antheris adnatis, reniformibus; fructu pedicellato, ovoideo vel fere globoso, 8 x 7 mm.

A tree 40–60 feet high, stems straight, 2–4 feet in diameter. Bark on trunk rough, intermediate between a Box and a Peppermint bark, smooth on the branches, which decorticates in short, thin ribbons.

**Juvenile leaves** not seen in the earliest stage, opposite, lanceolate, shortly petiolate and slightly glaucous, 6 cm. long, 3 cm. in diameter. Venation indistinct, the lateral veins diverging at an angle of 40–50° with the midrib.

**Intermediate leaves** somewhat glaucous when fresh, broadly and obliquely lanceolate, on long petioles, thin, coriaceous, 8–15 cm. long, 3–7 cm. broad; venation fairly distinct, the median nerve rather small, compressed beneath, slightly channelled above; lateral veins radiating at an angle of 20–40° with the midrib, the intramarginal vein distant from the edge.

**Mature leaves** alternate, petiolate, narrow-lanceolate to obliquely falcate-lanceolate, acuminate, the long slender apex often uncinat, rather thin and shining on both surfaces, with very obscure veins, 7–21 cm. long, 1.5–2.5 cm. broad, median nerve very slender, slightly raised beneath, faintly channelled above, usually excentric and closer to the lower margin; lateral veins diverging at an angle of 25–30° with the midrib; intramarginal vein close to the edge.

**Inflorescence** axillary, the peduncle compressed and slightly angular, 10–20 mm. long, bearing an umbel of 7–12 slender conoid-clavate buds; operculum conical, shorter than the calyx-tube. Anthers adnate, reniform, with broad cells and a minute terminal gland.

**Fruit** pedicellate, ovoid to nearly globular, truncate, rather thick, with a distinct flat or slightly oblique dark-coloured, thick disc; valves four, minute, enclosed below the lower edge of the disc, 6–7 x 8–9 mm.

*Illustrations.*—It is depicted in the present work, Part X, Plate 45, figs. 8a, 8b, 8c, 8d, under *E. piperita*, and at p. 304 it is referred to as follows :—“ At Wingello, New South Wales, there is an interesting tree known as ‘Messmate,’ one of two or three local trees which display variation. This particular ‘Messmate’ has fruits with rather thicker rim than the normal *piperita*, and some fruits even display a rim like *eugenioides*. It would be difficult, from fruits and leaves alone, to say whether this specimen is *eugenioides* or *piperita*, under which species I have accordingly arranged it. See fig. 8, Plate 45.”

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## RANGE.

So far, it appears to be confined to the Wingello district, New South Wales. “ There are several trees of this species growing in the vicinity of Wingello township. In general appearance they look like *E. pilularis*, by reason of their rough stems and smooth-barked branches.” (J. L. Boorman and Andrew Murphy).

## AFFINITIES.

### 1. With *E. piperita* Sm.

*E. congener* resembles *E. piperita* somewhat in the leaves, buds and to a certain extent in the fruits. The latter vary from pyriform to semi-pyriform, and are considerably thicker, with a prominent red rim, and a broader orifice than the typical *E. piperita*. Mr. J. L. Boorman suggests that it may be a natural hybrid between *E. piperita* and *E. Sieberiana*. The fruits and the juvenile leaves approach those of *E. Sieberiana* somewhat.

### 2. With *E. Bottii* Blakely.

This appears to be its closest affinity, from which it differs in being a smaller tree with leaves of a slightly different venation, and in the juvenile branches being reddish, not pruinose, in the fewer buds in the umbel, with their relatively shorter opercula, and in the thicker and different shaped fruits with their reddish, thick disc. The leaves also are less aromatic than those of *E. Bottii*, and the timber appears to be paler and inferior to the timber of the latter species.

### 3. With *E. urceolaris* Maiden and Blakely.

It would appear that both species have the same general appearance in the field, but the conoid-clavate buds and the pilular fruits of *E. congener* readily separate it from *E. urceolaris*, which has urceolate-rostrate buds, and distinctly urceolate fruits. Both species are said to yield a good durable timber, superior to that of the typical *E. piperita*.

## DESCRIPTION.

*CDI. E. nubilis* Maiden and Blakely, n.sp.

IRONBARK parva, glauca; foliis junioribus ovatis vel lato-lanceolatis, 7-14 cm. longis, 4-8 cm. latis; foliis maturis lanceolatis, glaucis, 6-16 cm. longis, 1.5-3 cm. latis; alabastris cylindraceis vel conoideis, obtusis; antheris reniformibus; fructu pyriformi; pedicellis gracilibus.

A small to medium-sized Ironbark, with a rugged, dark, fibrous bark throughout, and with slightly glaucous branchlets, leaves, buds and fruits.

**Juvenile leaves** not seen in the earliest stage, some of the lower leaves opposite for 3-4 pairs, petiolate, ovate to broad-lanceolate, slightly glaucous, coriaceous, 7-14 x 4-8 cm.; venation not very distinct, the lateral veins somewhat distant, diverging at an angle of 45-50° to the midrib; intramarginal vein usually distant from the edge.

**Mature leaves** alternate, petiolate, narrow-lanceolate to falcate-lanceolate or acuminate, coriaceous, rather dull and subglaucous, 6-16 x 1.5-3 cm.; venation obscure, the lateral veins usually spreading at an angle of 40° to the midrib; intramarginal vein close to the edge.

**Inflorescence** in axillary umbels or forming short terminal paniculate racemes. Buds 5-12 in the head, usually on slender, slightly angular, pedicels, ovoid to cylindrical, obtuse or rarely very acute, 10-12 x 5 mm., the campanulate calyx-tube usually shorter than the obtuse, conical operculum. Anthers reniform, with very broad lateral cells and a small terminal gland.

**Fruit** pedicellate, clavate to pyriform, 7 x 6 mm., or even smaller, slightly constricted at the top with a very small, scarcely visible ring and 3-4 very small, slightly exsert, valves.

**Timber.**—"Blue-leaf Ironbark." Mr. J. V. de Coque recently drew attention to this tree, and pointed out that its timber is inferior to that of the other Ironbarks of the Dubbo district. Its timber is of an inferior quality, both as regards "ringing" and "splitting" (cracking), so much so that the timber-getters never cut it except for rails. Mr. Boorman points out that it grows on slightly elevated lands, and is confined to such situations only. When growing in the forest it can readily be noted by its glaucous appearance. (Original description.)

**Illustrations.**—It is depicted at Plate 47, Part X, as *E. siderophloia* var. *glauca*, figs. 29-33.

## SYNONYM.

*E. siderophloia* Benth., var. *glauca* Deane and Maiden, *Proc. Linn. Soc. N.S.W.*, XXIV, 461 (1899).

## RANGE.

It is not plentiful and seems to be confined to moderately dry areas both in New South Wales and south-western Queensland.

*New South Wales.*—Between Murrumbidgee and Mudgee, also 8 miles from Dunedoo (Andrew Murphy); Peak Hill (R. H. Cambage). Not quite typical, but it is nearer to this species than to *E. siderophloia*. Minore (J. L. Boorman); 6 miles

rom Dubbo (H. Deane, J. L. Boorman. Type locality); Midway, near Dubbo (J. L. Boorman); Melleroi, Pilliga district (E. H. F. Swain); Gungal and Emmaville (J. L. Boorman).

*Queensland*.—A Box, similar to Gum-topped, occurs only on hard, elevated country, Inglewood (C. J. Smith, per C. T. White); Chinchilla State Forest (G. Singleton, per C. T. White).

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## AFFINITIES.

### 1. With *E. siderophloia* Benth.

It is readily separated from this species by the narrow, glaucous leaves, smaller buds and fruits. The latter have not the quadrangular pedicels of the typical *E. siderophloia*, and the juvenile leaves of *E. nubilis* are also smaller than those of *E. siderophloia*. It is also a much smaller tree, and although it has a moderately wide range, it is more restricted in its distribution than is *E. siderophloia*.

### 2. With *E. Murphyi* Maiden and Blakely.

The narrow mature leaves and the small fruits of *E. nubilis* are somewhat like those of *E. Murphyi*, but the latter species is not quite so glaucous, while the timber appears to be far superior to that of the former.

## DESCRIPTION.

### *CDII. E. Grasbyi* Maiden and Blakely, n.sp.

ARBOR 30-40 pedes alta, ad 20 uncias diametro; truncus sursum asper ad 6 pedes, deinceps glaber; folia juvenilia nondum visa; folia matura alternata petiolata, angusto-lanceolata, acuminata, uncinata, crassa, nitentia, 4-10 cm. longa, 5-14 mm. lata; venatio penninervia; inflorescentia umbellis axillaribus 4-8 parvorum florum; gemmae pedicellatae conicae, 6-25 mm.; operculum glabrum esquilongius calyci cyathiformi; filamenta gemmis longiora; antherae cellis latis; fructus adhuc non visus.

A tree, 30-40 feet high, up to 20 inches in diameter; trunk rough for about 6 feet, then smooth (Fitzgerald Fraser).

**Juvenile leaves** not seen.

**Mature leaves** alternate, petiolate, narrow-lanceolate, acuminate, uncinata, thick, pale-green, gossy on both sides, 4-10 cm. long, 5-14 mm. broad; venation penninerved, the median nerve distinct on both surfaces; lateral veins very fine, somewhat obscure, radiating at an angle of 30-35° with the midrib; intramarginal vein close to the edge. Oil glands very numerous.

**Inflorescence** in small axillary umbels of 4-8 small, white flowers. Peduncle slender, terete or nearly so. Buds pedicellate, conical, scarcely acute, 6 mm. long, the smooth conical operculum about one and a half times longer than the small cupular calyx; pedicels slender, scarcely as long as the buds. Filaments exceeding the buds, all antheriferous, with broad-celled anthers. Style slender, almost terete; stigma very small. Floral disc forming a small, dark, carnoselining around the calyx-tube, but free from the ovary.

**Fruit** not seen.

Named in honour of William Catton Grasby, Agricultural Editor of "The Western Mail," who for a number of years has taken a keen interest in the flora of Western Australia.

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## RANGE.

It is known only from Lake Barlee, Western Australia (Fitzgerald Fraser, through W. C. Grasby, September, 1919).

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## AFFINITIES.

### 1. With *E. Kochii* Maiden and Blakely.

It is a small slender tree like *E. Kochii*, with narrow-lanceolate leaves, and small slender buds. The leaves, however, are broader than those of *E. Kochii*, and although the buds are about the same size in both species, the operculum is more elongated in *E. Grasbyi*, and the calyx is relatively shorter.

### 2. With *E. longicornis* F.v.M.

It has the same shaped buds as *E. longicornis*, but they are considerably smaller, while the peduncle and pedicels are more filiform. When the fruit is obtained it will probably be much smaller and more hemispherical than that of *E. longicornis*.

## DESCRIPTION.

### *CDIII. E. Kochii* Maiden and Blakely, n.sp.

ARBOR parva gracilis; cortex glaber; ramuli subcompressi sed mox teretes; folia juvenilia nondum visa; folia matura alternata, petiolata, lineari-lanceolata, acuminata, nonnunquam uncinata, 3-8.5 cm. long, 5-9 mm. lata, venis obscuris; inflorescentia formans umbellas 3-6 florum pedicellatorum; gemmae cylindricae, 5-6 mm. longae. Platyantherae; capsulae late urceolate, 7 x 6 mm., valvis subulatis plerumque inclusis.

A small, slender tree; bark smooth; branches terete, covered with a smooth reddish bark which decorticates in small, thin, scaly pieces, leaving the branches smooth and pink.

**Juvenile leaves** not seen.

**Mature leaves** alternate, petiolate, linear-lanceolate, acuminate or uncinata, flat, moderately thick, gradually attenuated at the base into a slender, shortish petiole, 3-8.5 cm. long, 5-9 mm. broad. Venation obscure, only the median nerve visible without the aid of a lens, very fine and slightly channelled on both surfaces, as is usually the case with nearly all the interior or sand-plain species.

**Inflorescence** consisting of small axillary umbels, on short, slightly compressed peduncles, usually shorter than the buds, supporting 3-6 pedicellate flowers. Buds cylindrical, 5-6 mm. long, the operculum narrow-conical, obtuse or nearly so, thin, smooth, slightly longer than the pale-coloured campanulate calyx-tube. Filaments inflected in the bud, very long, except a few of the inner ones, which scarcely exceed the attenuated style; stigma very small, dark-coloured. Anthers (Platyantherae) rather large, the cells broad and globular when fully expanded.

**Fruit** pedicellate, broadly urceolate, truncate, thick, slightly rugose, 7 x 6 mm., 3-4 celled, with very fine subulate valves which sometimes slightly protrude beyond the contracted orifice.

*Illustrations.*—It is depicted, under *E. oleosa*, as a form, in this work, Part XV, Plate 66, figs. 2a, 2b, 2c.

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## RANGE.

It is known only from Watheroo rabbit fence, Western Australia (Max Koch, Nos. 1608, 1990, 1990a, September, 1905).

It is named in honour of the late Mr. Max Koch, who for more than thirty years took a very keen interest in the flora of South and Western Australia, and distributed specimens to the leading herbaria in different parts of the world. He died in 1925.

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## AFFINITIES.

### 1. With *E. oleosa* F.v.M.

It appears to differ from *E. oleosa* in habit and also in the bark, as well as in the narrow leaves, which dry a very pale colour, in the different shaped buds, and in the urceolate fruits.

### 2. With *E. Grasbyi* see page 40.

## DESCRIPTION.

### CDIV. *E. platycorys* Maiden and Blakely, n.sp.

MALLEE vel arbor parva; ramulis fere teretibus; foliis petiolatis, angusto-lanceolatis vel falcato-lanceolatis, apice acuminato vel uncinato, crassis pallido-viridibus, 5-8 cm. longis, 8-15 mm. latis, venis valde obscuris; alabastris solitariis vel geminis in pedunculo brevi; calyce cupulare, costato, 6 mm. longo, 6-7 mm. diametro; operculo depresso, conoideo vel convexo, striato, 4 mm. longo, 8 mm. diametro; fructu non viso.

A Mallee or small tree; branchlets almost terete.

**Juvenile leaves** not seen.

**Mature leaves** petiolate, narrow-lanceolate to falcate-lanceolate, acuminate, sometimes terminating in long uncinat points, thick, light green, smooth and glossy on both sides, 5-8 cm. long, 8-15 mm. broad; venation obscure, the median nerve alone conspicuous, slightly channelled on both surfaces; lateral veins almost invisible, radiating at an angle of 35° to the midrib; intramarginal vein confluent with the nerve-like margin; petioles terete, 9-12 mm. long, much darker than the leaves.

**Inflorescence** axillary. Buds solitary or in pairs, on slender, terete peduncles about 5 mm. long, almost sessile, mushroom-headed. Calyx broadly cupular, costate, dark brown, glossy, 6 mm. long, 6-7 mm. broad. Operculum depressed-conical or convex, of a greater diameter than the calyx-tube, striate, 4 mm. long, 8 mm. in diameter. Anthers adnate, with broad lateral cells. Fruit not seen.

## RANGE.

Known only from Boorabbin, west from Coolgardie, Western Australia (Dr. A. Morrison, 16th January, 1906).

We have had this specimen since 1906, and at one time labelled it *E. incrassata* var. *scyphocalyx* F.v.M., but after carefully comparing it with the type of var. *scyphocalyx*, came to the conclusion that it was a distinct species, and it was set aside, thinking that some day it would be augmented with additional material. As that wish has not been fulfilled, we decided to describe it and give it a name so as to attract the attention of local botanists to it. It appears to be an attractive looking plant, with narrow glossy leaves, and plump, dark-coloured mushroom-headed, striate buds. The fruits are unknown.

## AFFINITY.

It has nearly the same shaped buds as *E. Clelandi*, but they are not glaucous, and, moreover, they are fewer in the head. On the other hand, *E. Clelandi* is a more or less glaucous plant, while *E. platycorys* is dark to light green throughout.

## DESCRIPTION.

### *CDV. E. Kingsmilli* Maiden and Blakely, n.sp.

FRUTEX val arbor parva, 12–20' alta; foliis junioribus angusto-lanceolatis, 4–6 x 1 cm.; foliis maturis petiolatis, lanceolatis, tenuibus, venis paulo obscuris, 7–13 x 1.5–2.5 cm.; floribus axillaribus; filamentis flavis; alabastris plerumque triplicibus, in pedicellis longis, gracilibus, puniceis, rostratis, costis angustis 6–8; calycis tubo hemisphærico; fructu fere hemisphærico, disco prominente. 2 x 3 cm.

A shrub, or small tree, attaining a height of about 20 feet, with rough bark on the trunk, the upper branches being smooth. The crimson flower-buds give the tree a most ornamental appearance.

**Juvenile leaves** (not seen in the earliest stage, *i.e.*, not quite opposite, but earlier than I have ever seen them in any form of *E. pyriformis*) narrow-lanceolate, say 4–6 cm. long and 1 cm. in the widest part, with petioles of about 1 cm. Equally pale green on both sides, venation not conspicuous the secondary veins at an angle of about 45° with the midrib.

**Mature leaves** apparently not different from those of the normal form of *E. pyriformis*.

**Flowers** in an umbel usually of three, with a rounded or flattened peduncle of about 4 cm., with pedicels of half that length. Anthers as in *E. pyriformis*. Buds with calyx-tubes nearly hemispherical and about 2 cm. in diameter. The operculum continued into an almost pungent point. Both the calyx-tube and operculum covered with about eight thin prominent wings, about 4 mm. deep, giving the buds a remarkable appearance. The style about 1.5 cm. long, persistent, with the stigma of scarcely increased diameter. Anthers broad (Platytherae) with broad lateral cells and a very small terminal gland.

**Disc** at first concave, with a sharp raised inner ring flush with the top of the calyx-tube, which continues to grow upward, and at the same time expanding outwards, completely absorbing the concave cavity (noted in the early stages of its growth), until it reaches a height of 3–4 mm. above the level of the truncate calyx rim.

**Fruit** nearly hemispherical, 2.5 cm. in diameter, with eight prominent wings; these and the remainder of the calyx-tube (calycine rim) raised about the staminal ring.

This bizarre and showy variety, which promises to be an interesting addition to gardens in semi-tropical districts of low rainfall, is named in honour of the Hon. William Kingsmill, M.L.C., who has for many years taken a most active interest in forestry matters in Western Australia, and who has frequently assisted my botanical work for that State.

It is depicted in Part XLI, Plate 171, and described on p. 18.

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## SYNONYM.

*E. pyriformis* Turcz. var. *Kingsmilli* Maiden. It is a species quite distinct from *E. pyriformis*.



## RANGE.

Confined to Western Australia, as far as we know. From the East Murchison to Lake Way. The type from close to a mining camp called Mount Keith, about 160 miles north of Leonora (W. Kingsmill, July, 1918). I subsequently received the following specimen from the National Herbarium, Melbourne (Prof. Ewart). "Bush of 10 feet." Upper Ashburton River (W. Cuthbertson), 1888. This is the variety *Kingsmilli*, but with peduncles and pedicels shorter, and fruits smaller than in the type.

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## AFFINITIES.

1. With *E. pyriformis* Turcz.

It has the same kind of costate buds and fruits as *E. pyriformis*, but they are considerably smaller and more deeply winged. There is also a great deal of difference in the habit of the two species, *E. Kingsmilli* is sometimes a small tree, while *E. pyriformis* is a low branching shrub.

2. With *E. pachyphylla* F.v.M., Part XLI, Plate 171, figs. 1a, 1b, 2, 3.

This species appears to be its closest affinity, from which it differs in the larger and more prominently costate and pointed buds, with their long, slender pedicels, and larger and conspicuously winged fruits. It is also much taller, sometimes attaining a small tree 20 feet high, whereas *E. pachyphylla* is a small shrub not more than 6-10 feet high.

## DESCRIPTION.

### *CDVI. E. scyphocalyx* (F.v.M.) Maiden and Blakely, n.sp.

**MALLEE** parva; foliis junioribus non visis; foliis maturis angusto-lanceolatis, petiolatis, alternatis, 6-8 cm longis, 1 cm. latis; inflorescentia in umbellis brevibus axillaribus, floribus 3-6 breviter pedicellatis; alabastris cylindraceo-urceolatis, obtusis 10-12 mm. longis; calyce urceolato; antheris versatilibus; fructu breviter pedicellato dolioformi, 10 x 9 mm.

A Mallee or small tree.

**Juvenile leaves** not seen.

**Mature leaves** alternate, petiolate, narrow-lanceolate, somewhat thick, glossy and distinctly channelled on both surfaces, 6-8 cm. long, up to 1 cm. broad. Venation moderately distinct, the lateral veins very fine, diverging at an angle of 30-40° to the midrib; intramarginal vein usually somewhat distant from the margin.

**Inflorescence** in short axillary umbels of 3-6 shortly pedicellate, medium-sized flowers, the common peduncle compressed, rather short; buds cylindrical to cylindroid-urceolate, obtuse, 10-12 mm. long. Calyx campanulate-urceolate, smooth or faintly striate, 8 x 6 mm.; operculum broadly and obtusely conical smooth, broader and much shorter than the calyx. Filaments white, very numerous. Anthers moderately large, versatile, the cells broad, longitudinal, with a large globular dorsal gland occupying the upper half of the anther.

**Fruit** very shortly pedicellate, barrel shaped, 10 x 9 mm., faintly striate, the rim thin, rather sharp and oblique.

*Illustrations.*—It is figured in Part IV, Plate 13, figs. 5a, 5b, 5c.

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## SYNONYM.

*E. dumosa* A. Cunn., var. *scyphocalyx* F.v.M.

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## RANGE.

It has only been found at Eyre's Relief Camp, Great Australian Bight, Western Australia. Collector not known.

## AFFINITIES.

1. With *E. incrassata* Labill.

At one time I expressed the opinion that it was near the *E. incrassata* type, but after carefully comparing it with the type, we agree that it is a species distinct from *E. incrassata*, and from which it may be recognised by the narrow leaves, shorter peduncles, cylindrical buds with very short pedicels, and with a much broader, shorter, and more obtuse operculum. The calyx is also more cylindroid-urceolate and longer than the calyx of *E. incrassata*. The fruits are also more sessile and more barrel-shaped than the accepted type of *E. incrassata*.

2. With *E. dumosa* A. Cunn.

In botanical characters it has very little in common with this species, the buds and fruits being totally different to those of *E. dumosa*.

3. With *E. platycorys* Maiden and Blakely.

This species appears to be its closest affinity, from which it differs in the much longer buds, and narrower, non-striate operculum.

## DESCRIPTION.

*CDVII. E. Helmsii* Maiden and Blakely, n.sp.

APPARET Mallee vel arbor minor; folia juvenilia non visa; folia matura petiolata, linearia vel angustolanceolata, uncinata vel acuminata, valde nitentia, admodum crassa, 4-7 cm. longa, 5-15 mm. lata; inflorescentia umbellis axillaribus 2-6 florum; gemmae pedicellatae, cylindraceae, 10-12 mm. longae, 6-7 mm. diametro; calyx cyathiformis, crassus, costulatus; operculum late conicum, rugosum; filamenta numerosa, antherae latae, versatiles; capsulae nec in situ visae pedicellatae, late turbinatae, necnon rugosae, 8-9 mm. longae et sub apice aequaliter latae.

Probably a small tree or Mallee.

**Juvenile leaves** not seen.

**Mature leaves** petiolate, linear to narrow-lanceolate, acuminate or uncinata, very glossy, somewhat thick, 4-7 cm. long, 5-15 mm. broad, veins obscure, the midrib conspicuous and channelled on both sides; lateral veins very fine, diverging at an angle of 40-45° with the midrib, the intramarginal vein very close to the edge.

**Inflorescence** axillary; buds 3-6 on a slender peduncle, all pedicellate, somewhat cylindrical, acute, 10-12 mm. long, 6-7 mm. in diameter; calyx cupular or goblet-shaped, rugose or imperfectly ribbed, shining, rather thick, 6 x 5 mm.; operculum broadly conical to almost rostrate, thick, rugose, scarcely striate, shorter than the calyx-tube; filaments very numerous; anthers broad, versatile with a large ovate dorsal gland.

**Fruit** (detached) pedicellate, broadly turbinate, truncate, slightly corrugated, shining like the buds, 8-9 mm. long and about as broad at the top; disc narrow, slightly raised above the calycine ring, convex, the four short, broad, valves enclosed and quite free from the disc.

Named in honour of Richard Helms, who was Naturalist and Botanical Collector to the Elder Scientific Expedition.

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RANGE.

It was collected on the Elder Exploring Expedition, near Victoria Desert, Western Australia, Camp 59 (R. Helms, No. 14, 23rd September, 1891). The type. There are two specimens of loose fruits from Victoria Desert, Camp 56, (R. Helms, Nos. 13 and 26, 19th September, 1891) which appear to be referable to this species. The fruits, however, are slightly smaller and are almost smooth.

## AFFINITIES.

1. With *E. scyphocalyx*, n.sp. Maiden and Blakely.

It differs from this species in the shape of the buds and fruits. The buds of *E. scyphocalyx* are somewhat cylindrical-campanulate to cylindroid-urceolate, and very shortly petiolate. The fruits are also urceolate and nearly sessile, not turbinate as in *E. Helmsii*.

2. With *E. platycorys*, n.sp. Maiden and Blakely.

Both species have light green, narrow, shining leaves, but differ to a great extent in the shape of the buds, and particularly as regards the operculum, which is much broader and more dome-shaped in *E. platycorys*. The pedicels of the latter species are more abbreviated than those of the former.

## DESCRIPTION.

### CDVIII. *E. concinna* Maiden and Blakely, n.sp.

ARBOR parva gracilis, vel Mallee 6-12 pedes alta; foliis dilute viridibus, nitentissimis, 5-11 cm. longis, 1-3 cm. latis; inflorescentia in umbellis axillaribus 3-6 floris; floribus pedicellatis; operculo obtuso, striato, calyce brevior; antheris versatilibus, loculis longitudinalibus; fructu pedicellato, pyriformi vel clavato; valvis subulatis, exsertis (8-10 x 6-10 mm.).

A small slender tree or Mallee, 6-12 feet high.

**Juvenile leaves** not seen.

**Mature leaves** alternate, petiolate, narrow-lanceolate to falcate-lanceolate, more or less acuminate, light glossy green, somewhat thick and with a very obscure venation, 5-11 cm. long, 1-3 cm. broad; petioles slender, almost terete, 9-12 mm. long; lateral veins spreading at an angle of 40-45° to the midrib; intramarginal vein very close to the margin, and sometimes blending into the marginal nerve.

**Inflorescence** in axillary umbels of 3-6 pedicellate flowers, the peduncle compressed, broader at the top, 7-10 mm. long. Buds clavate, more or less angular, on slender, slightly compressed pedicels, ranging from 4-7 mm. long, sometimes two or more buds in the same cluster with longer pedicels than the others. Calyx cupular, 5-6 mm. long, smooth or faintly bicostate, with very faint parallel veins. Operculum blunt, depressed-hemispherical to cupola-shaped when inverted, striate, 3-4 mm. long, 6-7 mm. in diameter, usually of a greater diameter than the calyx-tube. Filaments numerous, far more numerous than in *E. dumosa*. Anthers moderately large, versatile, with broad cells and a large, oblong, dorsal gland. Floral disc obscure or rudimentary.

**Fruit** pedicellate, pyriform to mallet-shaped or somewhat turbinate, truncate, glossy, faintly and irregularly costate, 8-10 x 6-10 mm.; capsular disc obscure, valves subulate, lightly exserted.

It appears to be a striking species with light green leaves and unique clavate buds on long slender pedicels. It is depicted in Part IV, Plate 15, figs. 6a, 6b, under *E. incrassata* (miscellaneous forms).

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## RANGE.

Camp 49, Victoria Desert, Western Australia, Elder Exploring Expedition, 12th September, 1891 (R. Helms). The type. This is the only locality known to us.

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## AFFINITIES.

### 1. With *E. Griffithsii* Maiden.

The buds of both species are somewhat alike in shape, but those of *E. concinna* are more numerous in the head, much smaller, and less angular than the buds of *E. Griffithsii*. The fruits of the latter are also larger and more strongly costate than those of *E. concinna*.

### 2. With *E. ochrophylla*, n. sp. See p. 50.

### 3. With *E. dumosa* A. Cunn.

It has larger buds and different shaped fruits than the typical *E. dumosa*, and light-green, glossy leaves,

## DESCRIPTION.

*CDIX. E. ochrophylla* Maiden and Blakely, n.sp.

**MALLEE**, 6–25 pedes alta, caudice basi admodum aspero sursum glabro cinereo; folia juvenilia alternata sessilia vel petiolis brevissimis, glaucescentia, elliptico-oblonga, 2·5–3·5 x 1·5–2 cm.; folia matura alternata petiolata, angusto vel late lanceolata nunc falcata, nunc acuminata, 4–11 x 1·5–3·5 cm.; flores axillares, 5–7 pedunculo compresso; gemmae pedicellatae, clavatae, obtusae, 8–10 mm. longae; operculum depresso, hemisphaericum, leviter striatae; antherae versatilis cellis longitudinalibus latis; capsulae pedicellatae, clavatae, truncatae, 7–8 x 5–6 mm., valvis subulatis, exsertis.

A small shrub or Mallee, 6–25 feet high, with short, whitish stems with a little rough bark at base and light green glossy adult leaves.

**Juvenile leaves** not seen in the earliest stages, alternate, sessile, or very shortly petiolate, flat, dull drying a pale slaty-green, elliptical to oblong, 2·5–3·5 cm. long, 1·5–2 cm. broad; venation almost obscure, the median nerve somewhat prominent on the lower surface, slightly channelled on the upper; lateral veins diverging at an angle of 40–50° with the midrib; intramarginal vein close to the edge. Stems quadrangular; oil dots numerous.

**Intermediate leaves** not seen in a perfect state, alternate, shortly petiolate, oblong to lanceolate, thick, dull, drying a pale slaty-green, 3–8 cm. long, 1–2 cm. broad; veins obscure, the median nerve slightly prominent on the lower surface, compressed or channelled above; lateral veins very fine, spreading at an angle of 40–50° with the midrib.

**Mature leaves** alternate, petiolate, narrow to broad-lanceolate, or falcate-lanceolate, sometimes terminating in a long acuminate point, 4–11 cm. long, 1·5–3·5 cm. broad, flat, thick, coriaceous, yellowish-green, glossy on both sides; lateral veins very fine, radiating at an angle of 35–40° with the midrib; intramarginal vein usually close to the edge.

**Inflorescence** axillary, the common peduncle compressed, up to 13 mm. long, supporting 5–7 medium-sized white flowers. Buds pedicellate, clavate, 8–10 mm. long; operculum obtuse or depressed-hemispherical, slightly striate, thick, 5–6 x 2–3 mm. Calyx-tube wine-glass shaped, thick, more or less rugose, fully twice as long as the operculum. Filaments short, not numerous, apparently in one row. Anthers versatile, white, with broad longitudinal cells, and a large dorsal gland. Style short, thick, somewhat pyramidal at the base, persistent; stigma black, capitate. Floral disc forming a thick carnose lining around the shallow calyx-tube.

**Fruit** pedicellate, goblet-shaped to rounded-clavate, sometimes slightly contracted at the top, truncate, smooth and shining, 7–8 x 5–6 mm., valves usually 4, somewhat subulate, exsert; disc small, distinct, usually forming a flat or slightly convex band around the orifice.

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RANGE.

It seems to be mainly confined to the somewhat arid interior of South Australia. The following are the localities:—

*South Australia*.—Immana, near Ooldea (Professor J. B. Cleland, No. 67); Ooldea, said to be the Water Mallee (water in roots). Recognised by its yellow branchlets (same collector as above, Nos. 71, 72, and Ooldea Soak, No. 68); Mallee clumps. 15–25 feet

high, with ragged or ribbony bark, growing in flats between sand hills (E. H. Ising); buds and fruits not mature. Sand Hill east of Ooldea, Transcontinental Railway Survey (H. Deane, June, 1909); Barton, "Mallee" (Professor J. B. Cleland, No. 66); 70 miles south-west of Camp 17, Elder Exploring Expedition (R. Ramsey, 17th July, 1891).

*Western Australia*.—Comet Vale (J. H. Maiden, September, 1909).

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## AFFINITIES.

### 1. With *E. concinna* Maiden and Blakely.

There is a great deal of similarity in the buds of both species, but those of *E. ochrophylla* are less angular and the pedicels are much shorter. The fruit of the latter is also more mallet-shaped than that of the former.

### 2. With *E. striatacalyx* W. V. Fitz.

This is another species with striate buds, but the operculum is much longer and more pointed (as long or longer than the tube, original description) than that of *E. ochrophylla*, whilst the fruits are more campanulate, with a slightly different disc. *E. striatacalyx* is a much larger tree than *E. ochrophylla*, and it is also different in cortical characters.

### 3. With *E. dumosa* A. Cunn.

It resembles this species somewhat in the striate buds, but they are much broader and more obtuse than those of *E. dumosa*. The fruit also is larger and not campanulate like the fruit of *E. dumosa*. In the herbarium the leaves of *E. dumosa* usually dry a slaty-brown colour, whereas the leaves of *E. ochrophylla* dry a light yellow colour, and they are more glossy than those of *E. dumosa*.



## DESCRIPTION.

*CDX. E. Nicholi* Maiden and Blakely, n.sp.

**ARBOR** salici similis; ramis pendulis cortice sub-fibroso; foliis junioribus linearibus, crenulatis, 2-5 cm. longis, 3-6 mm. latis, foliis maturis lanceolatis vel falcato-lanceolatis, 6-12 cm. x 10-15 mm.; alabastris, ovoideis, acutis, pedicellatis; antheris versatilibus longitudinaliter dehiscentibus; fructu hemispherico vel globoso, 4 x 5 mm.

A singularly graceful tree, reminding one of a Weeping Willow. Height 30-50 feet, and trunk diameter 2 feet, as far as seen. The twigs are slender, a characteristic of the tree being the smallness and the grace of its parts. Bark sub-fibrous, Peppermint-like.

**Juvenile leaves** opposite for 2-4 pairs, sessile or nearly so, linear to linear-lanceolate, light green, somewhat crenulate, 2-5 cm. long, 2-5 mm. broad, venation very fine, sometimes obscure.

**Intermediate leaves** alternate, petiolate, broad-lanceolate, up to 5.5 cm. long, 1.5 cm. broad, venation very fine; lateral veins diverging at an angle of 20-35° to the midrib, intramarginal vein somewhat distant from the margin.

**Mature leaves** alternate, petiolate, narrow-lanceolate to falcate-lanceolate, thin, 6-12 cm. long 10-15 mm. broad, venation fine and somewhat irregular; lateral veins radiating at an angle of 35-40° to the midrib; intramarginal vein distinct from the nerve-like margin. A good deal of the young foliage reminds one superficially of that of the Wilga (*Geijera parviflora*).

**Buds** pedicellate, 5-8 or more in the head, elliptical to slightly urceolate, 5 x 3 mm.; operculum conical, slightly shorter than the campanulate calyx-tube. Anthers versatile, opening in parallel slits.

**Fruit** hemispherical to sub-globose, sometimes with a sharp rim, 4 x 5 mm. Valves well exerted; Pedicels about as long as the fruit; the common peduncle 7-10 mm. long.

**Timber** pale reddish, rather soft, not very durable.

**Vernacular Names.**—A “Peppermint” or “Narrow-leaved Peppermint” “Grey Peppermint” (H. Deane).

**Illustrations.**—It is depicted in Part XXII, Plate 93, figs. 6a-9a. See also Coloured Plate 7, figs. 62-64.

Named in honour of Richard Nichol, my private secretary and Chief Clerk, Botanic Gardens, who for nearly forty years has been a member of the Botanic Gardens staff and for the greater portion of that period has assisted me in many ways with my botanical work.

## SYNONYM.

*E. acaciæformis*, Deane and Maiden var. *linearis*, Deane and Maiden.

## RANGE.

New England, New South Wales. I have personally collected it from Yarrowitch to Walcha, and Mr. Henry Deane near Glen Innes. It also occurs in the Armidale district. "On slate formation at Enmore, head waters of Macleay River, 18 miles east of Uralla" (R. H. Cambage, No. 3780); Swamp Oak (E. H. F. Swain). "On quartz felsite, Mordun Creek, 12-14 miles south-east of Tingha. First record known to me west of the Great Northern Railway Line" (R. H. Cambage, No. 4444, 11th July, 1924). I have also received a specimen from the Botanic Gardens, Ootacamund, India (R. L. Proudlock).

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## AFFINITIES.

### 1. With *E. acaciæformis* Deane and Maiden.

It is readily distinguished from *E. acaciæformis* by the very narrow or linear juvenile leaves. Those of *E. acaciæformis* are broadly oblong to lanceolate. The fruits of *E. Nicholi* are also slightly smaller and have more prominent valves than the fruits of *E. acaciæformis*; the pedicels are also longer and more filiform. The branches of *E. Nicholi* are more pendulous than those of *E. acaciæformis*. In Part XLIX, p. 289, there is a note on the drooping branches. The seedling leaves are distinct from those of *E. acaciæformis*; they are opposite for a larger number of pairs, and linear, not oblong like those of *E. acaciæformis*.

### 2. With *E. nova-anglica* Deane and Maiden.

The buds and fruits of *E. Nicholi* are small, like those of the above species, but they are not glaucous.

## DESCRIPTION.

*CDXI. x E. Crawfordi* Maiden and Blakely, n.sp.

ARBOR mediocris, cortice ramulorum aspero, squamoso; folia juvenilia nondum visa; folia matura attenuata, petiolata, angusto-lanceolata, acuminata, 7-16 cm. longa, 1.5-3 cm. lata; flores 5-12 in umbellis axillaribus; gemmae pedicellatae, ovatae, acutae, circiter 6 mm. longae; antherae versatiles, longitudinaliter dehiscentes; capulae pedicellatae, campanulatae, 3-4 x 3-4 mm.

A supposed natural hybrid between *E. saligna* and *E. acaciiformis*. A tree up to 70 feet high, with a rough scaly bark extending to the small branches, the remainder of the branches smooth and of a pinkish colour.

**Juvenile and intermediate leaves** not seen.

**Mature leaves** alternate, petiolate, narrow-lanceolate, acuminate, thin, slightly paler on the lower surface, 7-16 cm. long, 1.5-3 cm. broad. Venation moderately distinct, and somewhat coarser than in *E. saligna*, the median nerve prominent beneath, faintly channelled above. Lateral veins irregular, often furcate, spreading at an angle of 45-55° with the midrib. Intramarginal vein close to the edge.

**Inflorescence** in axillary umbels, the peduncle slender, compressed, 6-8 mm. long, supporting 5-12 shortly pedicellate flowers. Buds yellowish-brown, ovate, acute; calyx-tube campanulate, 3 mm. long, and about as broad; operculum acutely conoid to rostrate, about the same length as the calyx-tube, the pedicels 2-3 mm. long. Filaments white; anthers versatile, with longitudinal cells and a large basal gland.

**Fruit** campanulate, truncate, pedicellate, somewhat thin, three or four-celled, the short, deltoid acute valves enclosed or slightly exceeding the small annular capsular disc which is evolved from the staminal ring, 4-5 mm. long, 4-4.5 mm. in diameter.

Named in honour of the late Mr. A. R. Crawford, of Moona Plains, Walcha, who was a keen student of our vegetation, and on several occasions brought under my notice (J.H.M.) the tree which now bears his name. It was my intention to figure it along with the other natural hybrids in Part LII, but it was overlooked.\*

## RANGE.

So far it has only been recorded from Moona Plains, Walcha, New South Wales, Mr. A. L. Crawford. In January, 1897, 1898, and in December, 1904, Mr. Crawford sent me specimens of this tree accompanied by the following note concerning it :—" No. 1, a supposed hybrid between *Eucalyptus saligna* and *E. acaciiformis*, Black Peppermint. Trunk rough from the ground to within 3-4 feet from tips of branches. The tree is about 70 feet high, and there are other young trees resembling it which are 20 or 30 feet high, perhaps seedlings of the large tree." In May, 1909, I received further specimens and a letter from Mr. Crawford, which is as follows :—" You may remember me writing to you re a hybrid *Eucalyptus*, *E. saligna* and *E. acaciiformis*. I have found another

tree about  $1\frac{1}{2}$  miles from here. It is a young tree, about 50 feet, with rough bark on stem and for some distance up the branches; where smooth, it is of a pinkish colour not so pronounced as the upper bark of *Tristania conferta*. It will not flower for some time yet, but I got a few fruits of it and also of *E. acaciæformis*, but none of *E. saligna*, except a few on a dry twig. The hybrid is a much smaller tree than either of the parents; it exudes kino resembling that of *E. acaciæformis*. I cut a piece of dead branch and it was paler than the wood of *E. saligna*. The timber of *E. acaciæformis* is red."

## AFFINITIES.

### 1. With *E. saligna* Sm.

It seems to partake of the botanical characters of *E. saligna*, especially in the venation of the leaves, and somewhat in the fruit. The buds, however, are longer and more pointed than those of *E. saligna*, and the fruit is smaller and more shell-like, with very fine needle-like valves which sometimes protude slightly beyond the orifice. It however, differs from *E. saligna* in the rough bark extending well out on the branches, and in the smooth bark being of a pinkish colour, not bluish as in *E. saligna*; the leaves are also uniformly narrower than those of *E. saligna*.

### 2. With *E. acaciæformis* Deane and Maiden.

It seems to resemble *E. acaciæformis* mainly in the rough bark which extends nearly all over the tree, and in the narrow leaves, small brownish buds, and in the very small fruits.

### 3. With *E. Deanei* Maiden.

It differs from *E. Deanei* in the shape of the buds and juvenile leaves, and also in the nature of the bark.

### 4. With *E. quadrangulata* Deane and Maiden.

Its small fruits are not unlike those of *E. quadrangulata*, but the leaf venation is distinct from that species and the bark and timber are also very dissimilar.

## DESCRIPTION.

*CDXII. E. glaucescens* Maiden and Blakely, n.sp.

MALLEE vel arbor parva; cortice levi, albo in stratis brunneis secedente; foliis junioribus oppositis, glaucissimis, ovatis vel orbicularibus; foliis maturis alternatis, petiolatis, glaucis, oblongo-lanceolatis vel falcato-lanceolatis; alabastris glaucis, triplicibus, sessilibus, cylindraceis; fructu glaucissimo, sessili, cylindraceo, crasso, truncato, 9-10 x 7 mm. diametro.

A Mallee, or sometimes a small tree, 12-40 feet high; live bark smooth, whitish; dead bark falling away in reddish-brown flakes.

**Juvenile leaves** opposite for an indefinite number of pairs, very glaucous, ovate to orbicular, entire or emarginate, sessile to shortly petiolate, 1.5-3 cm. long, and about as broad.

**Intermediate leaves** sessile, elliptical to cordate-lanceolate, 2-4 x 2-2.5 cm.; venation obscure.

**Mature leaves** alternate, petiolate, glaucous, oblong-lanceolate to falcate-lanceolate, thick, coriaceous, 10-13 cm. long, 1.5-2 cm. broad, somewhat obscurely nerved, the marginal nerve usually thickened; intramarginal vein fairly close to the edge, very thin; lateral veins rising at an angle of about 45° with the midrib.

**Inflorescence** axillary, very glaucous. Buds invariably in threes, all closely sessile, cylindrical, with a very short, mucronate operculum, 5-7 mm. long, 4-5 mm. in diameter; the common peduncle about half the length of the calyx-tube, compressed-angular, broader at the top.

**Fruit** very glaucous, closely sessile, cylindrical to barrel-shaped, thick, truncate with a slightly thickened rim, 9-10 mm. long, 7-8 mm. in diameter, valves usually enclosed, short and broad, corresponding to the rather broad cells, of which there are usually three.

*Illustrations.*—It is depicted in this work, Part XXVI, Plate 108, fig. 8*a*, mature leaf. 8*c*, fruits. (Fig. 8*b*, buds are *E. Gunnii*, drawn from Gunn's Tasmanian specimens and linked up in error with the Mount Baw Baw plant.) Plate 109, fig. 1*a*, young buds. The shape is correct, showing the very sharp rim and the small, acute operculum, but in the original specimen they are sessile, not pedicellate as shown; 1*b*, leaf and fruit; 1*c*, domed fruit Tingiringi Mountain, New South Wales (W. Baeuerlen). The type.

## SYNONYMS.

1. *E. Gunnii* Hook. f., var. *glauca* Deane and Maiden (in part), *Proc. Linn. Soc. N.S.W.*, xxiv, 464 (1899).
2. *E. Perriniana* F.v.M. Baker and Smith in "Research on the Eucalypts," 205 (1902), refer this species to *E. Perriniana* F.v.M.
3. *E. Gunnii* Maiden, non Hook. f., this work Part XXVI, 108 (1916), Plate 108, figs. 8*a*, 8*b*, 8*c*; Plate 109, figs. 1*a*, 1*b*, 1*c*.

## RANGE.

It seems to be confined to the cold mountain ranges of Victoria and New South Wales.

*Victoria*.—Summit of Mount Baw Baw (F. von Mueller), with large fruits and almost obliterated peduncles.

*New South Wales*.—Tingiringi Mountain, 5,400 feet, forming Mallee scrub, but sometimes single trees 40 feet high (W. Bauerlen, 20th June, 1887, also No. 195, March, 1889); Wollandibby, Jindabyne (W. Bauerlen), 12–15 feet; Little Tindery Mountain, Michelago (J. L. Boorman, January, 1909). Co-type

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## AFFINITIES.

### 1. With *E. Gunnii* Hook. f.

It appears to be a smaller tree than *E. Gunnii*, and more frequently Mallee-like in habit. The inflorescence of both species is somewhat alike, but the common peduncle of *E. glaucescens* is usually much shorter and broader than that of *E. Gunnii*, while the buds of the latter are all pedicellate and the operculum is larger. The fruits of both species are also somewhat similar, but those of *E. glaucescens* are usually larger, closely sessile and more cylindrical than the fruits of *E. Gunnii*. The latter is confined to Tasmania.

### 2. With *E. Perriniana* F.v.M.

Both are alpine species and have much in common as regards size, habit, glaucousness and inflorescence, but the connate juvenile leaves of *E. Perriniana* readily separate it from those of *E. glaucescens*. There is also a marked difference in the shape of the buds and fruits of both species.

## DESCRIPTION.

### CDXIII. *E. Archeri* Maiden and Blakely, n.sp.

**FRUTEX** parvus; cortice levi, albo; foliis junioribus lato-ovatis vel spathulatis; foliis maturis angustis vel lato-lanceolatis, petiolatis, dilute viridibus; alabastris triplicibus, sessilibus, cylindraceis, 5-6 mm. longis; antheris versatilibus, loculis longitudinalibus; fructu conoideo vel campanulato, 6 x 7 mm., valvis insertis.

A small shrub, or dwarf stunted tree, with a white bark.

**Juvenile leaves** not seen in a fully developed state, broadly ovate to spathulate, emarginate, 3-5 x 2.5-3.5 cm. Venation obscure.

**Mature leaves** alternate, petiolate, thick, coriaceous, light green, narrow to broad-lanceolate, or falcate-lanceolate, 5-10 x 1-3 cm.; venation obscure; lateral veins diverging at an angle of 35-40° with the midrib; intramarginal vein distant from the edge. Petioles yellowish-brown to reddish-brown, punctate, with small dark dots.

**Inflorescence** in small axillary umbels of three flowers on short, compressed peduncle. Buds sessile or nearly so, oblong or cylindrical, 5 x 6 mm., calyx-tube campanulate, warty, three times longer than the very small, obtuse operculum. Anthers versatile, with longitudinal cells.

**Fruit** ovoid to campanulate, yellowish, 6 x 7 mm., valves enclosed or very slightly exsert, but not seen in a ripe state.

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## RANGE.

It is a Tasmanian species, and is only known from the following localities:— Western Mountains (W. H. Archer, January, 1848). The type. Mount Barrow (Rev. H. M. R. Rupp, January, 1921).

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## AFFINITIES.

### 1. With *E. Gunnii* Hook. f.

It differs from *E. Gunnii* in being strictly glabrous in all its characters, in the yellowish-green leaves, and in the smaller, sessile buds and fruits. The leaves of *E. Gunnii* are glaucous.

### 2. With *E. vernicosa* Hook. f.

It has nearly the same coloured foliage as *E. vernicosa*, but the leaves are longer. The buds and fruits are also smaller and of a different shape to those of *E. vernicosa*.

## DESCRIPTION.

### CDXIV. *E. subcrenulata* Maiden and Blakely, n.sp.

ARBOR parva, caulibus brevibus, levibus; foliis junioribus sessilibus, ovatis vel orbicularibus, subcrenulatis, pallido-viridibus; foliis maturis lato-lanceolatis, petiolatis; alabastris ovoideis vel globosis, levibus, sessilibus; fructu hemispherico, truncato, nitente, rugoso, 5 x 7 mm.

A small alpine tree, with smooth, crooked stems.

**Juvenile leaves** sessile, ovate to orbicular, subcrenulate, light green, glossy.

**Intermediate leaves** petiolate, ovate to oblong, thick, semicrenulate, up to 8 cm. long and 4 cm. broad.

**Mature leaves** petiolate, broadly ovate to oblong-lanceolate, glossy, light green, abruptly tapering into a long sub-terete, glandular, petiole, flat, thinly coriaceous, the margins revolute and often crenulated, especially at the top, which is obtuse or mucronate, 5-10 cm. long, 3-5 cm. broad. Venation moderately distinct, the lateral veins few and distant, making an angle of 40-45° to the midrib. Intramarginal vein distant from the edge.

**Inflorescence** axillary, the very short peduncle supporting three sessile flowers with white filaments. Buds sessile, globular to ovoid or somewhat cuneate at the extreme base, dark brown. Calyx hemispherical to cupular, thick, shining, somewhat rugose. Operculum blunt, very shallow, about half the length of the calyx-tube. Anthers versatile, opening in long parallel slits, with a large dorsal gland. Floral disc forming a thin lining over the conical base of the ovary.

**Fruit** sessile, hemispherical to shortly campanulate, shining, glandular or irregularly pitted-rugose, convex, valves slightly protruding, but not seen in a fully ripe state, 5 x 7 mm. Capsular disc represented by the somewhat thickened staminal ring and calycine rim.

The leaves are somewhat shining, with a resinous-like substance, but not sticky, light-green with yellowish-brown petioles, or the same colour as the semi-terete glandular twigs. It seems to be a very marked species, showing affinity to *E. Johnstoni* and *E. vernicosa*. See this work Part XXVIII, Plate 116, fig. 8a, mature leaf and buds; 8b, anthers.

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## RANGE.

Mount Field East, Tasmania (at an elevation of about 4,000 feet, J. H. Maiden, March, 1906). It is written up in this work, Part XXVIII, p. 181, as "A form showing transit to *E. vernicosa*."



## AFFINITIES.

1. With *E. vernicosa* Hook. f.

It differs from the above species in the broadly ovate to broadly-lanceolate, thick, shining, different shaped leaves, in the very blunt buds, which are more globular, in the round, smooth operculum, and in the more hemispherical fruits.

2. With *E. Johnstoni* Maiden.

It is closely allied to this species, and may be an alpine form with considerably reduced leaves and buds and smooth fruits. It has, also, the crenulate leaves of *E. Johnstoni*, a character which is rather unique in the genus, and which is confined to about three other species.

## DESCRIPTION.

### CDXV. *E. Tindalae* Blakely, n.sp.

STRINGYBARK gracilis, 30-60' alta, 6-18" diametro; cortice fibroso alte sulcato; foliis junioribus alternatis, breviter petiolatis ovatis vel ovato-lanceolatis leniter hispidis, foliis maturis alternatis, petiolatis lanceolatis vel falcato-lanceolatis, acuminatis, crassis 6-16 x 2-4 cm.; venis irregularibus; inflorescentia in umbellis axillaribus 7-14 flores; alabastris cylindraceis, obtusis; operculo calycis tubo pallidiore et brevioris; fructu depresso-globoso, crasso, sessili; disco calycis tubo fere aequilongo, 8-10 x 5-6 mm.; valvis parvis inclusis vel leniter exsertis.

A slender Stringybark, 30-60 feet high or more, 6-18 inches in diameter, with a deeply furrowed fibrous bark on trunk and main branches, the smaller branches almost smooth. In the early days the bark was largely used by the settlers for roofing.

**Juvenile leaves** not seen in the earliest stage, alternate, ovate to ovate-lanceolate, slightly hispid, 3.5-6 cm. long, 2-3 cm. broad, petioles very short; internodes slightly hairy.

**Intermediate leaves** alternate, very shortly petiolate, broadly elliptical to obliquely lanceolate, the broader ones acuminate, thin, glossy on the upper surface, dull and much paler beneath, 5-11 cm. x 2.5-5 cm.; venation very fine, the lateral veins rather numerous, diverging at an angle of 40-50° to the midrib, which is very conspicuous beneath; intramarginal vein distant from the edge.

**Mature leaves** alternate, petiolate, lanceolate to falcate and obliquely lanceolate, acuminate, moderately thick, 6-16 cm. x 2-4 cm.; venation somewhat irregular, the lateral veins distant, radiating at an angle of 40-45° to the midrib; intramarginal vein close to the edge.

**Inflorescence** in axillary umbels of 7-14 flowers, the peduncle slender, slightly compressed, 10-12 mm. long. Buds cylindrical, blunt, the operculum much paler and slightly shorter than the brownish somewhat elongated calyx-tube, 6 mm. long, 3.5 mm. in diameter. Anthers small, reniform with a small, terminal gland.

**Fruit** depressed globular, closely sessile, thick, the smooth reddish disc nearly as deep as the calycine portion, 8-10 x 5-6 mm.; valves usually four, very small, enclosed or slightly exsert.

Named in honour of Miss Ann Tindal, of Ramornie, Clarence River, who, for a number of years, has taken a keen interest in the flora of the district.

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## RANGE.

Denman (W. Heron, January, 1909); near Copmanhurst at the head of the salt water, Clarence River; Orara River near Ramornie Meat Works; both localities are in New South Wales (W. F. Blakely and D. W. C. Shiress, 28th July, 1922). The fruits of the Copmanhurst specimen are slightly larger than those from the Orara.

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## AFFINITIES.

1. With *E. laevopinea* R. T. Baker.

It differs from *E. laevopinea* mainly in the smaller, different shaped buds and in the sessile, depressed-globular fruits.

2. With *E. agglomerata* Maiden.

This species does not appear to extend to the Upper Clarence, but it resembles *E. Tindalæ* in the general appearance of the bark and habit, but seems to differ from it in the juvenile leaves, in the shape of the buds, and to a lesser extent in the fruit. The oil is also different. The juvenile leaves of *E. Tindalæ* have a rather pleasant geranium-like odour, those of *E. agglomerata* are somewhat rank.

3. With *E. Wilkinsoniana* R. T. Baker.

The habit and general appearance of both trees are somewhat similar; the buds, however, of *E. Tindalæ* are more cylindrical and more shortly petiolate than those of *E. Wilkinsoniana*, while the fruits of the former are sessile and thicker than those of the latter. There is perhaps very little difference in the oil of both species, as they appear to possess almost the same odour; if anything, the odour of *E. Tindalæ* is not quite so strong as that of *E. Wilkinsoniana*. The timber has not been examined

## DESCRIPTION.

CDXVI. *E. Wilkinsoniana* R. T. Baker.

*Proc. Linn. Soc. N.S.W.*, xxv, 678 (1900), with a figure of a fruit on Plate XLVI, fig. 2.  
(Syn. *E. hæmastoma* var. F.v.M., "Eucalyptographia" Dec.II;\* *E. lævopinea* var. minor).

In Part VIII, p. 221 of the present work I stated that I looked upon *E. Wilkinsoniana* R. T. Baker and *E. nigra* R. T. Baker as being inseparable from *E. eugenioides* on the one hand, and from *E. Muelleriana* on the other. Recent investigations have shown that I was in error, and I now admit both are valid species. The following is the original description :—

A medium-sized tree with a thin, compressed Stringybark, not furrowed.

**Sucker leaves** lanceolate, falcate, generally under 3 inches long and under 6 lines wide, oblique, thin, venation oblique, parallel, distant; marginal vein removed from the edge.

**Leaves** of mature trees similar to sucker-leaves, only larger.

**Flowers** in axillary peduncles of about 6 lines long. Calyx small, 1 line long, 2 lines is diameter; pedicel about 1 line. Operculum small, hemispherical, acuminate; outer stamens apparently sterile; anthers kidney-shaped. Ovary flat-topped.

**Fruit** hemispherical, 5 lines in diameter, rim thick, red; valves slightly exserted, acute.

**Habitat**.—Dromedary Mountain (C. S. Wilkinson, F.G.S.); Colombo (W. Bauerlen); Barber's Creek (H. Rumsey); Sutton Forest (R. T. Baker).

This is the "Stringybark" variety of *E. hæmastoma* Sm. mentioned by Baron von Mueller in his "Eucalyptographia" under that species. It was first observed in this colony by the late Government Geologist, Mr. C. S. Wilkinson, F.G.S., at Dromedary Mountain, at an elevation of 1,500 feet above sea level, and named for him by Mueller as stated above.

**Timber** pale-coloured, very hard, close-grained, heavy. In transverse and compression tests it stands higher than that of any of the Stringybarks above enumerated. It is evidently an excellent timber and is strongly recommended for forest conservation.

*Illustrations*.—This work, Part VIII, Plate 38 :—

10a, Buds and flowers; 10b, Fruits, Walcha (A. R. Crawford).

12a, Leaf; 12b, Buds; 12c, Fruits Attunga, 12 miles north-west of Tamworth (R. H. Cambage). Fruits with slightly longer pedicels than the type.

16a, Leaf in the intermediate stage; 16b, Mature leaf; 16c, Buds; 16d, Fruits, Stanthorpe, Queensland (A. Murphy).

17a, Buds; 17b, 17c, 17d, Fruits taken from the same tree of the type of *E. Wilkinsoniana* R. T. Baker (*E. lævopinea* R. T. B. var. *minor*), Glenrock Paddocks, Barber's Creek (H. J. Rumsey).

18a, Buds; 18b, Fruits of co-type, Sutton Forest (R. T. Baker). The fruits of 18b, with flat rim, are closest to the form in 17b, and not a stable form. They are more or less unripe.

\* The statement that *E. hæmastoma* Sm. var. in "Eucalyptographia" Dec. 2, is a synonym of *E. Wilkinsoniana* is founded on a misapprehension. See *Proc. Linn. Soc. N.S.W.*, 1904, p. 760. The original specimen is *E. Sieberiana* F. v. M.

## RANGE.

In the present state of our knowledge, it appears to extend from Dimboola in Victoria to southern Queensland.

*Victoria*.—Dimboola (F. Reader). The buds are almost identical with those from Burragorang.

*New South Wales*.—Southern Localities—Near Goulburn (Dr. J. B. Cleland). Buds and fruits almost the same as the type. Barber's Creek or Tallong (H. J. Rumsey). Also labelled by Mr. Baker as the type. Sutton Forest (R. T. Baker). Labelled by Mr. Baker as the type. Marulan (A. Murphy); Cobbity, banks of the Nepean (J.H.M.); Burragorang (R. H. Cabbage), fruit almost identical with those of the type; Kanangara Walls (W. F. Blakely); Wolgan River (R. H. Cabbage, No. 1549).

Northern Localities.—Murrurundi (J.H.M. and J. L. Boorman); Moggrani Mountain, Gloucester (J.H.M.); Upper Hastings River, cutting near Yeldham's (J.H.M.); Taree and Gloucester (W. Heron); Armidale (W. Howitt, J.H.M.); Tamworth district (R. H. Cabbage); Yarrowitch (J. L. Boorman); Tia, *via* Walcha (J.H.M.); Walcha (E. Bette, F. W. Campbell); Tenterfield (L. G. Irby); Tenterfield to Sandy Flat, near Mount Spiraby (J.H.M.); Bald Knob on the Grafton-Glen Innes Road (H. T. Paton); Glen Innes (N. Stewart); Glen Elgin (J. L. Boorman); Wilson's Downfall (R. H. Cabbage, Nos. 2822, 2826, 2839); Acacia Creek (W. Dunn); Foot of Mount Lindsay (W. Forsythe).

*Queensland*.—Stanthorpe (J. L. Boorman and A. Murphy); "Yellow Stringybark," Landsborough, North Coast Railway (P. MacMahon); Dalveen (A. Sargent); Yungaburra (C. T. White, No. 1572), juvenile leaves broad, very shortly petiolate, softly stellate-hairy.

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## AFFINITIES.

### 1. With *E. eugenioides* Sieb.

The bark and timber ally it to *E. eugenioides*, "White Stringybark," and in botanical sequence it is placed next to that species (original description).

### 2. With *E. lœvopinea* R. T. Baker.

The oil resembles that of *E. lœvopinea* Baker, but no other characters connect it with that species. The red rim of the fruits has evidently been the cause of the misplacing of this, but it is now well known that this is a character common to a number of Eucalypts. It is a feature quite absent from *E. lœvopinea* Baker, in fact, the fruits of the two species are so very different that the trees could not be synonymised with any degree of correctness in specific naming. The bark, leaves, venation and timber of these trees also differ. *E. lœvopinea* Baker has a hard, compact bark right out to the branchlets, whilst this tree has a light-coloured, loose, stringybark, not extending out to the limbs. It is quite distinct in specific characters from the two Stringybarks described in this paper, viz., *E. nigra* and *E. umbra*. (Original description).

## DESCRIPTION.

CDXVII. *E. nigra* R. T. Baker.

*Proc. Linn. Soc. N.S.W.*, xxv, p. 689 (1900) with Plate XLVI, fig. 3.

A TALL tree with a black stringy bark.

Leaves lanceolate, scarcely falcate, occasionally oblique, mostly under 4 inches long, and under 1 inch wide, of a dull green colour; venation only faintly marked on the upper surface, but very distinct on the lower; lateral veins oblique, distant; intramarginal vein removed from the edge.

**Peduncles** axillary, short, under 4 lines, bearing a cluster of from 8–12 small flowers. Calyx hemispherical, under 2 lines in diameter, on a short pedicel. Operculum hemispherical, acuminate, about  $1\frac{1}{2}$  lines long when mature. Ovary flat-topped. Anthers very small, parallel, filaments very slender. Fruits about 4 lines in diameter, hemispherical to pilular, rim variable, thin or truncate, and even domed occasionally; valves slightly exserted.

**Habitat**.—Richmond River district (W. Bauerlen); Cook's River, Sydney (H. G. Smith).

From *E. Wilkinsoniana* Baker and *E. macrorrhyncha* F.v.M. it differs in fruits, timber and chemical constituents of the oil. From the Stringybark, *E. umbra* Baker, of this paper it differs in the shape of the sucker leaves and chemical constituents of the oil, although the immature fruits of these species are somewhat similar.

*E. eugenioides* Sieb. and *E. capitellata* Sm. approach each other very closely in morphological characters, and there often seems to be a gradation between the two, but, nevertheless, the two species are quite distinct; and so in this, although there also appears some similarity in the fruits of this species and *E. eugenioides*, yet the two differ in too many characters to be the same species.

The sucker leaves are not unlike those of *E. capitellata*, whilst the buds are similar to those of *E. eugenioides*. The fruits approach somewhat in shape those of the latter species, with which it has probably been confounded in the past when determined on dried specimens. If it were not for the distinctive character of the timber and oil, I should certainly have made it a variety of *E. eugenioides*, but the former product is of too poor a character to be associated with so excellent a timber as that yielded by White Stringybark, *E. eugenioides*. The oil also differentiates it entirely from that species.

On the sum of the above differences it was decided to give the tree specific rank, and botanically it is placed next to *E. dextropinea* Baker (*E. Muelleriana* Howitt), from which it differs in the shape of the fruits, bark, leaves and chemical constituents. From *E. laevopinea* Baker it differs in the shape of the fruits, quality of timber and constituents of the oil.

**Timber**.—Of a dark-brown colour (hence the specific name), much affected with borers and not valued for durability by timber-getters and others interested in the trade.

**Oil**.—Yield very small, only  $3\frac{1}{2}$  oz. from 534 lb. of leaves, in fact, too small to make a fractional distillation. It has thus the smallest yield of the Stringybarks next to *E. capitellata* (H. G. Smith).

**Illustrations**.—It is figured in Part VIII, Plate 38, under *E. Muelleriana* Howitt, and allies, and the following figures are referable to it:—

Fig. 13, Fruits, Harding's Mill, near Glen Innes, New South Wales (H. Deane).

Fig. 14*a*, Buds; 14*b*, and 14*c*, fruits, all obtained from the same tree, Kanimbla Valley, Lowther-road, New South Wales (A. H. S. Lucas and J.H.M.).

Fig. 15*a*, Buds; 15*b*, fruits of the type of *E. nigra* Baker, Woodburn, Richmond River (W. Bauerlen).

In "Research on Eucalyptus" Mr. Baker depicts two fruits on p. 53, with the following comment:—"The fruits are very much like those of *E. eugenioides*."

## RANGE.

The localities quoted by Mr. Baker in "Research on the Eucalyptus" (2nd edition), p. 53, are:—Richmond River district, Cook's River, Sydney, Blackheath, New South Wales. The following specimens in the National Herbarium, Sydney, appear to be referable to it:—

New South Wales, Kanimbla Valley, Lowther-road (A. H. S. Lucas and J.H.M.); Harding's Mill near Glen Innes (H. Deane); "Stringybark," Parish Babzil, County Rouse, Casino (E. G. McLean); Black Stringybark, Woodburn, Richmond River (W. Bauerlen). Sent to me by Mr. Baker as typical.

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## AFFINITIES.

These are discussed by the author in the original description, but at the same time I would like to draw attention to the fact that many specimens of buds and fruits of typical *E. eugenoides* approach the type of *E. nigra*, and on the whole they accentuate the close relationship of the two species. And, notwithstanding the author's remarks in reference to the affinity of *E. nigra* with *E. eugenoides* and *E. Wilkinsoniana*, there is much field work to be done before one can definitely state what the real differences are between them.

The outstanding difference appears to be in the broad suckers of *E. nigra* in contradistinction to those of its allies.

## EXPLANATION OF PLATES 288-291.

## PLATE 288.

*E. Bucknelli* Cabbage.

- 1*a*. Juvenile leaf; 1*b*, twig with buds; 1*c*, anthers; 1*d*, 1*e*, mature leaves; 1*f*, fruits. Parish Bundoo-withidie, county Courallie, Moree district, N.S.W. (W. M. Brennan).  
 2*a*, 2*b*. Mature leaves from north of Mungindi, towards Thallon, N.S.W. (R. H. Cabbage, No. 4394, 20th September, 1922).  
 3. Fruits with exerted valves, from Bumble Station, 70 miles north of Mungindi (R. H. Cabbage, No. 4402, 21st September, 1922.).

*E. perplexa* Maiden and Blakely.

- 4*a*. Juvenile leaf, but not in the earliest stage; 4*b*, twig with fruits. Isdell River, near Mount Barnett Homestead, Western Australia (W. V. Fitzgerald, No. 1082, June, 1905).  
 5. Twig with fruits with exerted valves. Darwin to Roper River (Prof. Baldwin Spencer, July-August, 1911).

*E. conglomerata* Maiden and Blakely.

- 6*a*. Juvenile leaves; 6*b*, mature leaf.  
 7*a*. Intermediate leaf.  
 8*a*, 8*b*. Mature leaves; 8*c*, twig with buds; 8*d*, anthers; 8*e*, young fruits; 8*f*, mature or nearly mature fruits. Beerwah, Southern Queensland (W. D. Francis and C. T. White, No. 24, September, 1919). The type.

## PLATE 289.

*E. tropica* Cabbage.

- 1*a*, 1*b*. Juvenile leaves.  
 2*a*. Fruiting twig with small fruits; 2*b*, plan of fruit slightly enlarged. Croydon, North Queensland (R. H. Cabbage).  
 3*a*. Twig with larger fruits and narrow mature leaf; 3*b*, plan of fruit enlarged.  
 4. Small leaf. All from Corella River, 30 miles north of Cloncurry, North Queensland (R. H. Cabbage). The type.

*E. pseudo-piperita* Maiden and Blakely.

5. Intermediate leaf.  
 6. Twig with buds and fruit; 6*a*, anthers. Taronga Park, Sydney (D. W. C. Shiress and A. S. Le Souef, August, 1918, May, 1919).

*E. urceolaris* Maiden and Blakely.

7. Rostrate, urceolate buds; 7*a*, anther. Mittagong (D. W. C. Shiress, January, 1926).

*E. Callanii* Blakely.

- 8*a*, 8*b*. Types of juveniles leaves.  
 9*a*, 9*b*. Mature leaves. They are very glossy on both sides, as if varnished.  
 10*a*. Buds; 10*b*, anthers.  
 11. Fruits. All from junction of Mittagong and Wombeyan Caves road, N.S.W. (D. W. C. Shiress and W. F. Blakely, April, 1923).

*E. pachycalyx* Maiden and Blakely.

- 12*a*. Flowering twig with three mature leaves; 12*b*, buds; 12*c*, back and front view of anthers. Atherton, Queensland (H. W. Mocatta, December, 1915).



## PLATE 290.

*E. subviridis* Maiden and Blakely.

- 1*a*. Broad intermediate leaf; 1*b*, orbicular juvenile leaf; 1*c*, narrow intermediate leaf; 1*d*, mature leaf.  
 2*a*. Buds; 2*b*, flowers; 2*c*, anthers.  
 3*a*. Unripe fruits; 3*b*, mature fruits; 3*c*, plan of fruit. Near the Pound Yard, Marulan (A. and P. Murphy, December, 1921, December, 1922).

*E. McClatchie* Kinney.

- 4*a*. Twig with buds; 4*b*, fruits.  
 5*a*. Twig with buds and a much longer mature leaf than 4*a*; 5*b*, back view of anthers.  
 6. Mature leaf.  
 7*a*. Fruits; 7*b*, plan of fruit. Santa Monica, California, in canyon. (Metcalf, No. 70, per Miss Alice Eastwood).

*E. Mortoniana* Kinney.

- 8*a*. Mature leaf; 8*b*, buds and operculum; 8*c*, anthers; 8*d*, fruits; 8*e*, fruits. Golden Gate Park, California (Miss Alice Eastwood and Eric Walther, December, 1920, July, 1921, February, 1922).

## PLATE 291.

*E. Dixsoni* Wakefield.

- 1*a*, 1*b*, 1*c*. Types of juvenile leaves from the same twig.  
 2*a*, 2*b*, 2*c*. More advanced juvenile leaves from the same twig as 1*a-c*.  
 3*a*. Intermediate leaves.  
 4*a*. Broad mature leaf; 4*b*, mature leaf.  
 5*a*. Narrow mature leaf; 5*b*, buds and narrow mature leaf; 5*c*, anther.  
 6. Fruits and plan of fruit. All from 3½ miles east from Yambulla Mountain, N.S.W. (F. W. Wakefield, June, 1920).

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

*acacioides* A. Cunn. (xlviii).  
*acmenioides* Schauer (xxxii).  
*affinis* Deane and Maiden (lvi).  
*amygdalina* Labill. (xvi).  
*Andrewsi* Maiden (xxi).  
*Baileyana* F.v.M. (xxxv).  
*Bakeri* Maiden (lxx).  
*Baueriana* Schauer (lvii).  
*Baueriana* Schauer var. *conica* Maiden (lviii).  
*Behriana* F.v.M. (xlv).  
*bicolor* A. Cunn. (xlv).  
*Boormanii* Deane and Maiden (xlv).  
*Bosistoana* F.v.M. (xliii).  
*Caleyi* Maiden (lv).  
*capitellata* Sm. (xxviii).  
*conica* Deane and Maiden (lviii).  
*Consideniana* Maiden (xxxvi).  
*coriacea* A. Cunn. (xv).  
*corymbosa* Sm. (xii).  
*crebra* F.v.M. (liii).  
*Dalrympleana* Maiden (lxiv).  
*dives* Schauer (xix).  
*dumosa* A. Cunn. (lxv).  
*eugenioides* Sieber (xxix).  
*fruticetorum* F.v.M. (xlii).  
*gigantea* Hook. f. (li).  
*globulus* Labill. (lxvii).  
*goniocalyx* F.v.M. (vi).  
*hæmastoma* Sm. (xxxvii).  
*hemiphloia* F.v.M. (vi).  
*longifolia* Link and Otto (ii).  
*Luehmanniana* F.v.M. (xxvi).  
*macrorrhyncha* F.v.M. (xxvii).  
*maculata* Hook. (vii).  
*Maideni* F.v.M. (lxix).  
*melanophloia* F.v.M. (liv).

*melliodora* A. Cunn. (ix).  
*microcorys* F.v.M. (xxxviii).  
*microtheca* F.v.M. (lii).  
*Muelleriana* Howitt (xxx).  
*numerosa* Maiden (xvii).  
*obliqua* L'Hérit. (xxii).  
*ochrophloia* F.v.M. (l).  
*odorata* Behr and Schlechtendal (xli).  
*oleosa* F.v.M. (lx).  
*paniculata* Sm. (viii).  
*pilularis* Sm. (xxxi).  
*piperita* Sm. (xxxiii).  
*Planchoniana* F.v.M. (xxiv).  
*polyanthemosa* Schauer (lix).  
*populifolia* Hook. (xlvii).  
*propinqua* Deane and Maiden (lxi).  
*punctata* DC. (x).  
*radiata* Sieb. as *amygdalina* (xvi).  
*regnans* F.v.M. (xviii).  
*resinifera* Sm. (iii).  
*robusta* Sm. (lxviii).  
*rostrata* Schlecht. (lxii).  
*rubida* Deane and Maiden (xliii).  
*saligna* Sm. (iv).  
*siderophloia* Benth. (xxxix).  
*sideroxylon* A. Cunn. (xiii).  
*Sieberiana* F.v.M. (xxxiv).  
*Smithii* R. T. Baker (lxx).  
*stellulata* Sieb. (xiv).  
*tereticornis* Sm. (xi).  
*tessellaris* F.v.M. (lxvi).  
*Thozetiana* F.v.M. (xlix).  
*viminalis* Labill. (lxiv).  
*virgata* Sieb. (xxv).  
*vitrea* R. T. Baker (xxiii).

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\* Government Printer, Sydney. 4to. Each part contains 4 plates and other illustrations.

NOTE BY GOVERNMENT PRINTER.

Financial conditions have so largely affected publications that it is no longer possible to continue the issue of "The Forest Flora of New South Wales" at the old rates, and from this date onward, *i.e.*, from and including Part 7, Vol. VII, the price of the individual Parts will be raised to 2s. 6d. each.

For those Parts already published the old sale price will be adhered to, and subscriptions already received will not be disturbed, but the new subscription rate of 2s. 6d. per part, or 25s. for 12 parts, will come into effect as from the 1st July, 1921.

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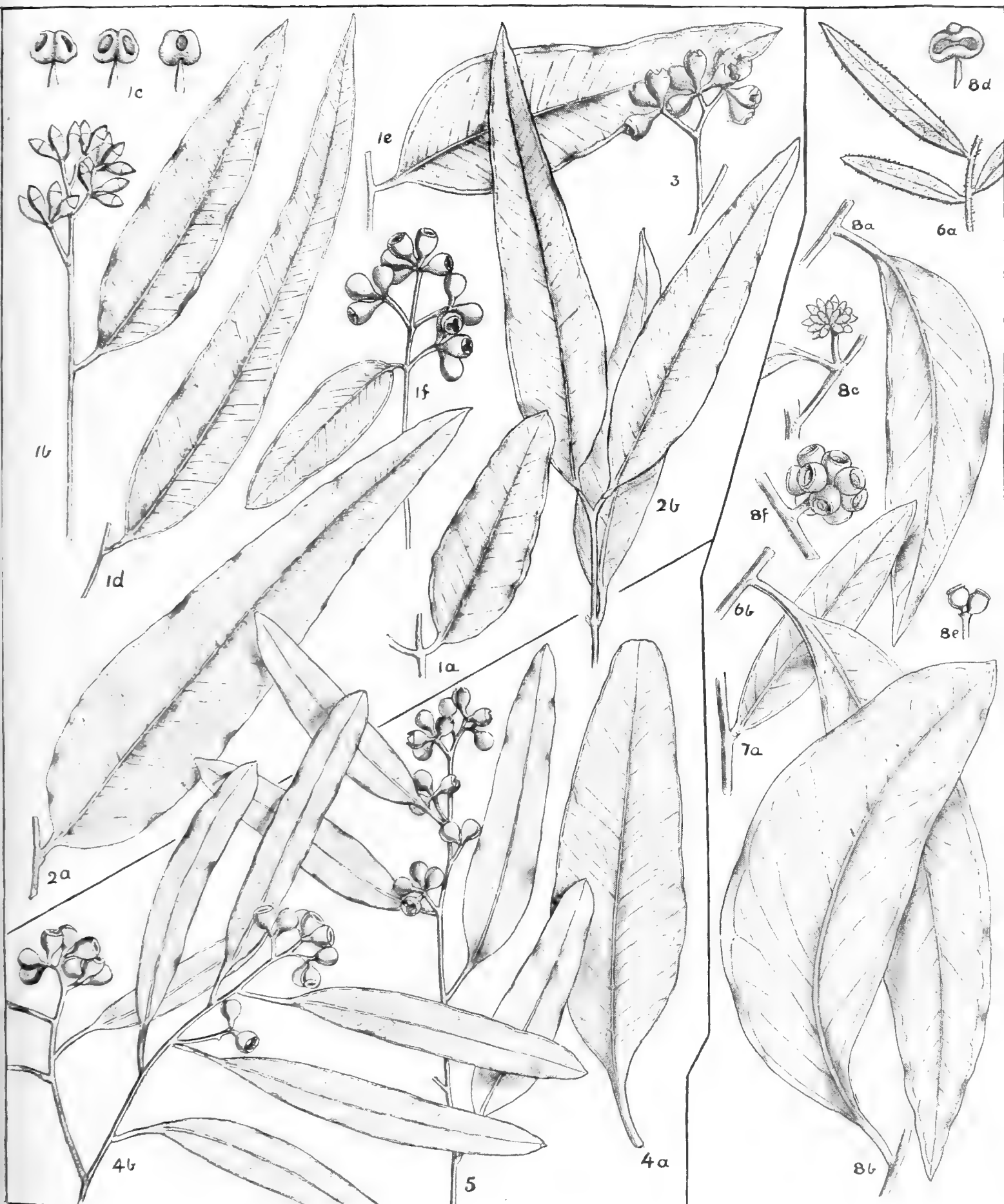
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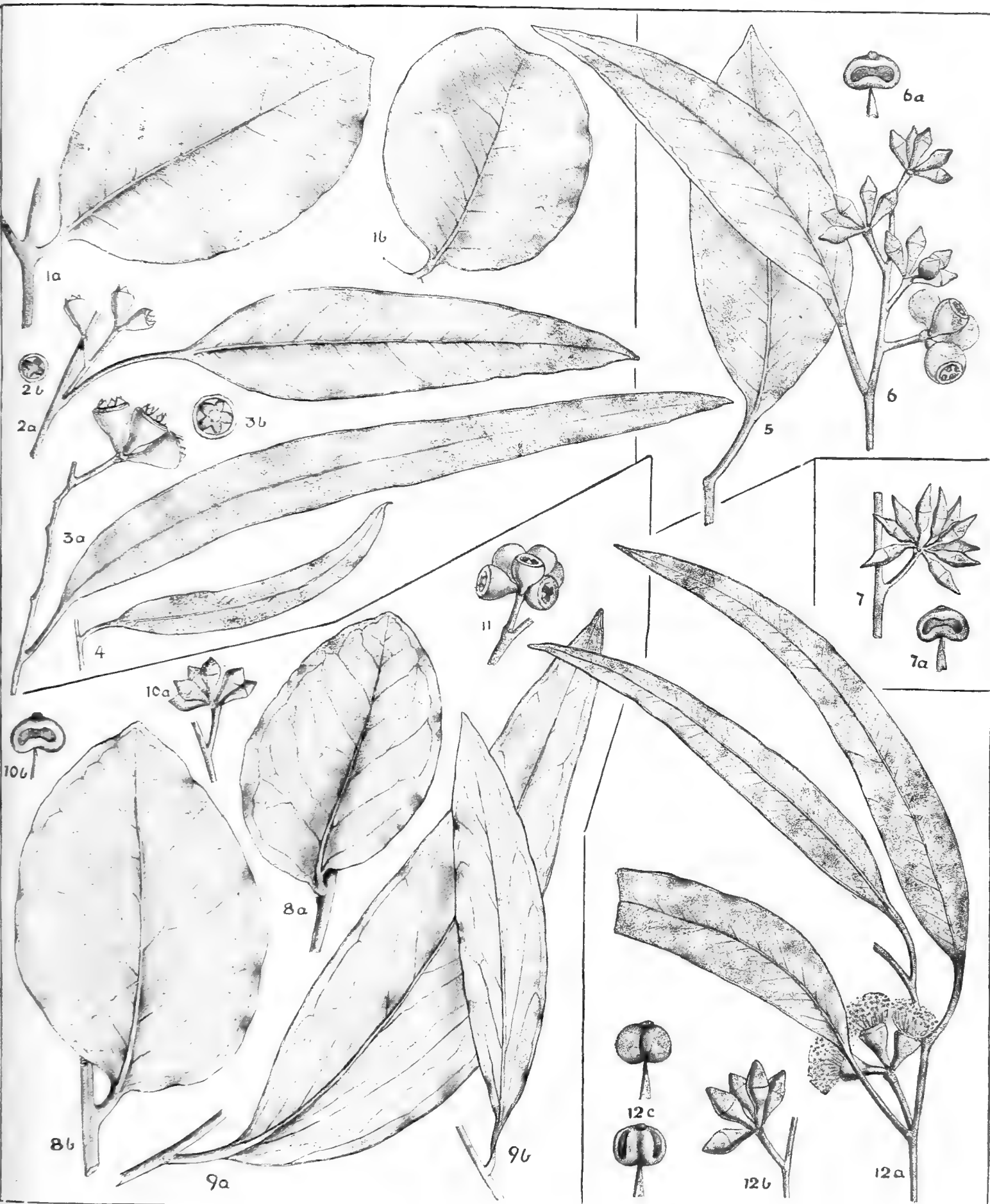
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M. FLOCKTON. del.

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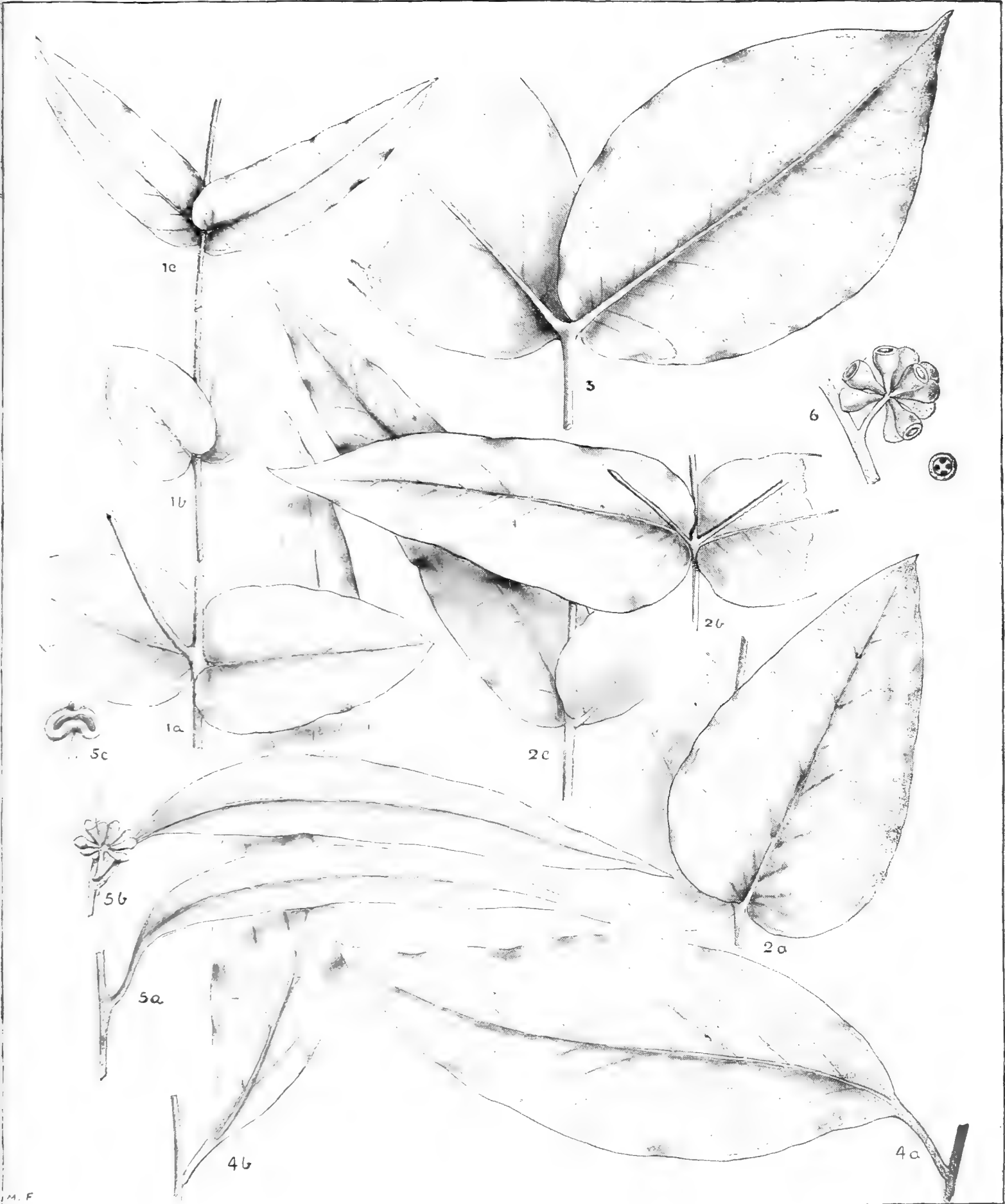




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EUCALYPTUS DIXSONI WAKEFIELD.



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237. *E. calophylla* R.Br.  
238. *E. hamatoxylon* Maiden.  
239. *E. maculata* Hook.  
240. *E. Mooreana* (W. V. Fitzgerald) Maiden.  
241. *E. approximans* Maiden.  
242. *E. Stowardi* Maiden.  
Plates 176-179. (Issued November, 1920.)

## PART XLIV.

243. *E. perfoliata* R. Brown.  
244. *E. ptychocarpa* F.v.M.  
245. *E. similis* Maiden.  
246. *E. lirata* (W. V. Fitzgerald) Maiden, n.sp.  
247. *E. Baileyana* F.v.M.  
248. *E. Lane-Poolei* Maiden.  
249. *E. Ewartiana* Maiden.  
250. *E. Bakeri* Maiden.  
251. *E. Jacksoni* Maiden.  
252. *E. eremophila* Maiden.  
Plates, 180-183. (Issued February, 1921.)

## PART XLV.

253. *E. erythrocorys* F.v.M.  
254. *E. tetradonta* F.v.M.  
255. *E. odontocarpa* F.v.M.  
17. *E. capitellata* Smith.  
256. *E. Camfieldi* Maiden.  
257. *E. Blaxlandi* Maiden and Cabbage.  
258. *E. Normantonensis* Maiden and Cabbage  
Plates, 184-187. (Issued April, 1921.)

## PART XLVI.

259. *E. tetragona* F.v.M.  
260. *E. eudesmoides* F.v.M.  
261. *E. Ebbanoensis* Maiden n.sp.  
15. *E. Andrewsii* Maiden.  
262. *E. angophoroides* R. T. Baker.  
263. *E. Kybeanensis* Maiden & Cabbage.  
264. (dup. of 252) *E. eremophila* Maiden.  
70. *E. decipiens* Endl.  
Plates, 188-191. (Issued May, 1921.)

## PART XLVII.

265. *E. Laseroni* R. T. Baker.  
266. *E. de Beuzevillei* Maiden.  
267. *E. Mitchelliana* Cabbage.  
268. *E. Brownii* Maiden and Cabbage.  
269. *E. Cabbageana* Maiden.  
123. *E. miniata* A. Cunn.  
*E. Woodsiana* R. T. Baker.  
44. *E. odorata* Behr. and Schlechtendal.  
43. *E. hemiphloia* F.v.M., var. *microcarpa* Maiden.  
42. *E. bicolor* A. Cunn.  
270. *E. Pilligaensis* Maiden.  
271. *E. Penrithensis* Maiden.  
112. *E. micranthera* F.v.M.  
272. *E. notabilis* Maiden.  
273. *E. canaliculata* Maiden.  
Plates, 192-195. (Issued July, 1921.)

## PART XLVIII.

61. *E. paniculata* Sm.  
274. *E. decorticans* sp. nov.  
275. *E. Culleni* R. H. Cabbage.  
276. *E. Beyerii* R. T. Baker.  
98. *E. globulus* Labill.  
277. *E. nova-anglica* Deane and Maiden.

## I. The Growing Tree.

- Rate of growth.  
Natural afforestation.  
Increment curves  
The largest Australian trees.  
Plates 196-199. (Issued August, 1921.)

## PART XLIX.

278. *E. drepanophylla* F.v.M.  
38. *E. leptophleba* F.v.M.  
279. *E. Dalrympleana* Maiden.  
280. *E. Hillii* Maiden.  
217. *E. dichromophloia* F.v.M.

## I. The Growing Tree—continued.

- Nanism.  
The flowering of Eucalypts while in the juvenile leaf stage.  
Dominance or aggressiveness of certain species.  
Natural grafts. Artificial grafts.  
Fasciation. Tumours and galls.  
Protuberances of the stem.  
Abortive branches (prickly stems)  
Pendulous branches.  
Vertical growth of trees.  
Plates, 200-203. (Issued September, 1921.)

## PART L.

281. *E. Houseana* (W. V. Fitzgerald) Maiden  
282. *E. Jutsoni* Maiden.  
283. *E. adjuncta* Maiden.  
1. *E. pilularis* Sm., var. *pyriformis* Maiden.  
284. *E. pumila* Cabbage.  
285. *E. rariflora* F. M. Bailey.  
286. *E. Mundijongensis* Maiden.

## II. The Bark (and Habit).

1. Early references to Eucalyptus barks and early Eucalyptus vernaculars in general.  
2. Eucalyptus bark classifications.  
O. Mallees, Marlocks, and other small species—  
(a) True Mallees.  
(b) False Mallees.  
(c) Marlocks.  
Plates, 204-207. (Issued December, 1921.)

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287. *E. Sheathiana* Maiden.  
288. *E. striatocalyx* W. V. Fitzgerald.  
289. *E. taeniola* Baker and Smith.  
82. *E. Stricklandi* Maiden.  
290. *E. unalata* Baker and Smith.  
31. *E. Planchoniana* F.v.M.  
21. *E. marginata* Sm.  
291. *E. Irbyi* Baker and Smith.  
292. *E. Yarraensis* Maiden and Cabbage, n.sp.

## II. The Bark (and Habit)—continued.

1. *Leiophloia* (Smooth-Barks or Gums).  
2. *Hemiphloia* (Half-barks).  
3. *Rhytiploia* (Rough-barks).  
4. *Pachyphloia* (Stringybarks).  
5. *Schizophloia* (Ironbarks).  
6. *Lepidophloia* (Barks friable and lamellar).  
Plates, 208-211. (Issued February, 1922.)

## PART LII.

160. *E. amplifolia* Naudin.  
292. x *E. algeriensis* Trabut.  
293. x *E. antipodensis* Trabut.  
294. x *E. Bourlieri* Trabut.  
295. x *E. Cordieri* Trabut.  
296. x *E. gomphocornuta* Trabut.  
297. x *E. jugalis* Naudin.  
*E. occidentalis* Endl., var. *oracensis* Trabut.  
298. x *E. pseudo-globulus* (Hort.) Naudin  
299. x *E. Trabuti* Vilmorin.  
*E. Stuartiana* x *globulus* Trabut.  
300. x *E. Insizwaensis* Maiden n.sp.

## II. The Bark—concluded.

3. Classification of Trees in General by Means of their Barks.  
4. Variation in Barks of the same Species.  
5. Bark in Relation to Heat and Cold.  
6. Adventitious Shoots.  
7. Ringbarking.  
8. Coppice-growth (suckering).  
9. Twist in Bark.  
10. Bark Repair.  
11. Microscopic Characters of Bark.  
12. Calcium Oxalate.  
13. Tannin.  
14. Oil in Bark.  
15. Fibre in Bark.  
16. Colour of Inner Bark.  
17. Colour of Outer Bark.  
Plates, 212-215. (Issued April, 1922.)

## PART LIII.

301. x *E. Barmedmanensis* Maiden n.sp.  
302. x *E. Tenandrensis* Maiden n.sp.  
303. x *E. Peacockeana* Maiden n.sp.  
304. x *E. Stopfordi* Maiden n.sp.  
305. x *E. Forsythii* Maiden n.sp.  
306. x *E. Auburnensis* Maiden n.sp.  
307. x *E. Yagobiei* Maiden n.sp.  
308. x *E. Blackburniana* Maiden.  
309. x *E. Studleyensis* Maiden n.sp.

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- Historical.—Early Attempts at Classification  
Modern Systems of Classification.  
Colours.  
Plates, 216-219 (Issued May, 1922.)

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310. *E. McIntyrensis* n.sp.  
 311. *E. Pluti* McCoy.  
 312. *E. Kayseri* R. M. Johnston.  
 313. *E. Milligani* R. M. Johnston.  
 314. *E. Delftii* Ettingshausen.  
 315. *E. Diemenii* Ettingshausen.  
 316. *E. Hayi* Ettingshausen.  
 317. *E. Houtmanni* Ettingshausen.  
 318. *E. Mitchellii* Ettingshausen.  
 319. *E. cretacea* Ettingshausen.  
 320. *E. Davidsoni* Ettingshausen.  
 321. *E. Ozeleyana* Ettingshausen.  
 322. *E. scoliohylla* Ettingshausen.  
 323. *E. Warraghiana* Ettingshausen.  
 324. *E. praecoriacea* Deane.  
 325. *E. Hermant* Deane.  
 326. *E. Howitti* Deane.  
 327. *E. Kitsoni* Deane.  
 328. *E. Suttoni* formerly *E. Muellieri* Deane.  
 329. *E. Chapmani* formerly *E. Woollsi* Deane

## III. Timber—concluded.

- Microscopic Structure. Crystals (Calcium Oxalate).  
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 Fissility and Interlockedness. Inflammability  
 Destructive Distillation. Ash.  
 Plates, 220-223. (Issued July, 1922.)

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 D.—*Myrtophyllum* (*Eucalyptus* ?) Geinitzi Heer.  
 E.—*Myrtophyllum* (*Eucalyptus* ?) Schubleri Heer.  
 F.—*E. sibirica* Heer.  
 G.—*E. (?) americana* Lesqx.  
 H.—*E. borealis* Heer.  
 I.—*E. angusta* Velenovsky.  
 J.—*E. dubia* Ettingshausen.  
 K.—*E. dakotensis* Lesquereux.  
 L.—*E. Gouldii* Ward.  
 M.—*E. proto-Geinitzi* Saporta.  
 N.—*E. Choffati* Saporta.  
 O.—*E. (?) attenuata* Newberry.  
 P.—*E. (?) angustifolia* Newberry.  
 Q.—*E. (?) nervosa* Newberry.  
 R.—*E. (?) parvifolia* Newberry.  
 S.—*E. latifolia* Hollick.  
 T.—*E. Wardiana* Berry.  
*Myrcia havanensis* Berry.

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Adventitious Roots.

## V. Exudates.

- a. Kinos.  
 b. Mannas.  
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## PART LVI.

330. *E. Jensenii* n.sp.  
 331. *E. Umbraoarrensis* n.sp.  
 332. *E. leptophylla* F.v.M.  
 68. *E. uncinata* Turcz.  
 333. *E. angusta* n.sp.  
 21. *E. marginata* Sm.  
 22. *E. buprestium* F.v.M.  
 41. *E. Bosistoana* F.v.M.  
 213. *E. altior* (Deane and Maiden) Maiden.  
 334. *E. conglobata* (R.Br.), Maiden.  
 335. *E. angulosa* Schauer.  
 146. *E. Johnstoni* n.sp.

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## PART LVII.

336. *E. agglomerata* Maiden.  
 337. *E. Simmondsii* n.sp.  
 23. *E. sepulchralis* F.v.M.  
 200. *E. torquata* Luehmann.  
 338. *E. Kalganensis* n.sp.  
 339. *E. melanoxydon*, n.sp.  
 240. *E. Isingiana* n.sp.  
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 343. *E. Rummeryi* n.sp.  
 344. *E. Herbertiana* n.sp.  
 345. *E. Comitæ-Vallis* n.sp.  
 107. *E. longifolia* Link and Otto.  
 346. *E. citriodora* Hooker.  
 43. *E. hemiphloia* F.v.M.  
 347. *E. microcarpa* n.sp.  
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 211. *E. longicornis*, F.v.M.  
 152. *E. propinqua*. Deane and Maiden, var. *major* n. var.  
 35. *E. haemastoma* Sm.  
 349. *E. micrantha* DC.  
 350. *E. Shirensii* Maiden and Blakely, n.sp.  
 351. *E. crucis*, n.sp.  
 212. *E. Flocktonia* Maiden.

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- D.—Androecium. Auther. Gynoecium. Ovary. &c.  
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## PART LX.

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- Historical. Capsule. Valves. Rim.  
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## PART LXI.

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 353. *E. xanthoneura* Turczaninow.  
 354. *E. Schlechteri* Diels.  
 29. *E. apiculata* Baker and Smith.  
 33. *E. Sieberiana* F.v.M.  
 28. *E. virgata* Sieb.  
 46. *E. acacioides* A. Cunn.  
 56. *E. Naudiniana* F.v.M.  
 59. *E. Caley* Maiden.  
 64. *E. Baueriana* Schauer.  
 75. *E. falcata* Turcz.  
 194. *E. Spenceriana* Maiden.  
 201. *E. radiata* Sieb.  
 202. *E. numerosa* Maiden.  
 203. *E. nitida* Hook, f.  
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### VIII. The Fruit (concluded).

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 357. *E. Sargenti*, n.sp.  
 11. *E. Risdoni* Hook, f., var. *elata* Benth.  
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 359. x *E. Taylori* n.sp.  
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4. Seeds for Food of Aborigines.
5. Sterile Seeds. Use of the term "Chaff."
6. Seeds Figured by Mueller in "Eucalyptographia."
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4. Figures of Intermediate Leaves.  
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(For continuation see last page.)

# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

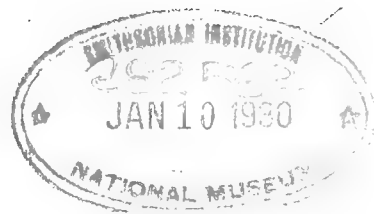
(Lately Government Botanist of New South Wales and Director of the  
Botanic Gardens, Sydney).

VOL. VIII. PART 2.

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PART LXXII OF THE  
COMPLETE WORK.  
(WITH FOUR PLATES.)

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PRICE THREE SHILLINGS AND SIXPENCE.

*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney:  
ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER.

1929.

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1. *E. pilularis* Sm., and var. *Muelleriana* Maiden.  
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81. *E. goniantha* Turcz.  
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83. *E. Campaspe* S. le M. Moore.  
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# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

(Lately Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

---

The author of this standard work, Mr. J. H. Maiden, I.S.O., F.R.S., F.L.S., died on 16th November, 1925, at the age of 66 years.

It is most regrettable that he did not live to see the completion of his great work, of which 65 Parts have already appeared, and the final Parts were prepared by him for publication prior to his death.

With the kind permission of Dr. Darnell-Smith, Director, Botanic Gardens, Sydney, this and the subsequent Parts will be edited by Messrs. R. H. Cambage, C.B.E., F.L.S., and W. F. Blakely, Assistant Botanist, Botanic Gardens, both of whom have been in constant touch with the late Mr. Maiden during the progress of the work.

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## VOL. VIII. PART 2.

### Part LXXII of the Complete Work.

(WITH FOUR PLATES.)

---

*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

---

PRICE THREE SHILLINGS AND SIXPENCE.

*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney:

ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER, PHILLIP-STREET.





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## DESCRIPTION.

### CCLXXXV. *E. rariflora* Bailey.

This work, Part L, p. 303, Plate 207, figs. 1 and 2.

THE juvenile and mature leaves are depicted, together with the buds, anthers and fruits. They are in every detail almost identical with those of *E. populifolia*, figured at Part X, Plate 48. Under "Affinities" I pointed out that both species are closely related. I also drew attention to the fact that in *E. populifolia* the leaves are sometimes narrow like the adult leaves of *E. rariflora*, while the juvenile leaves appear to be alike in both species. It may be, as formerly stated by me, an isoblastic and heteroblastic species.

The two forms of *E. populifolia* occur in New South Wales and Queensland, and they are known to bushmen as "Round-leaved Bimble Box" and "Narrow-leaved Bimble Box." The latter seem to be identical with *E. rariflora*, and are figured under *E. populifolia*, Part X, Plate 48, fig. 14, mature leaf, North Bourke, A. Murphy; 18*a*, leaf with flowers and immature fruits; 18*b*, anthers. Fragments of the type of *E. bicolor* A. Cunn. var. *parviflora* Muell., Burdekin River, Queensland (from Kew). A flowering twig and fruits are depicted in the "Forest Flora of New South Wales," Part XLVII, Plate 176, figs. C and D.

---

## RANGE.

It seems to be confined mainly to New South Wales and Queensland.

*New South Wales*: Zara, via Hay (Miss Edith Officer); Euabalong (J. L. Boorman); Nyngan (J. H. Maiden, Dr. E. C. Chisholm); Coolabah (J. H. Maiden and J. L. Boorman); Canbelego (W. Bauerlen); North Bourke (A. Murphy); "Bastard Box," Tarella, Wilcannia (W. Bauerlen); Bohena Creek, South-east Pilliga (W. A. W. de Beuzeville); Pilliga Bore (W. A. W. de Beuzeville); Killamey State Forest, about 7 miles from Narrabri (Gordon Burrow).

*Queensland*: Silverwood, Darling Downs (C. T. White); Eidsvold, and 5 miles along the Dalgangal Road from Eidsvold (Dr. T. L. Bancroft); Barakula, a little north of Chinchilla (J. E. Young, per C. T. White); Burdekin River (F. Mueller).

## AFFINITIES.

I have already discussed the affinities of *E. rariflora* and *E. populifolia* in Part L, p. 304.

With *E. bicolor* A. Cunn.

Under *E. populifolia*, Part X, p. 339, I stated "There are many gradations of size and width of leaf. The species is usually very easily recognised, but the narrow lanceolate leaves may be a pitfall in some cases; they then sometimes show affinity to *E. bicolor*." Apart from the mature leaves of the latter being like those of *E. rariflora*, there is also a striking resemblance in the buds and fruits of both species, but the juvenile leaves of *E. bicolor* are much narrower than those of *E. rariflora*, while the timber of the former is red, and that of the latter pale brown.

## DESCRIPTION.

CDXVIII. *E. polycarpa* F.v.M.

In *Journ. Linn. Soc.*, iii, 88 (1859).

It is described in English in Part XL, p. 321, and is figured at Plate 166, figs. 6 and 7.

## SYNONYM.

*E. pyrophora* Benth., var. *polycarpa* Maiden.

In the above Part of the present work I looked upon it as a variety of *E. pyrophora*, but I am now of opinion that it is a valid species.

## RANGE.

The following additional localities may be added to those already quoted in Part XL, p. 324 :—

*Northern Territory* : Kelly's Well, also near No. 5 Northern Wells, Alice Springs district (C. E. F. Allen, Nos. 613, 641, 656).

*New South Wales* : Redbank, *via* Bourke (W. Howell); "Small tree, mostly large Mallee type, flowers cream (sometimes pink)," Tibooburra (A. Morris, No. 797).

## AFFINITIES.

They are already dealt with in Part XL, p. 325. In the herbarium it is readily separated from *E. pyrophora* in the much smaller and more slender inflorescence and in the smaller and thinner fruits. The floral branches in *E. pyrophora* are much swollen, those of *E. polycarpa* are almost normal and more slender. The timber of the former appears to be larger and darker than that of the latter.



## DESCRIPTION.

*CDXIX.* × *E. Langii* Maiden and Blakely, n.sp.

**ARBOR** circiter 40' alta; ramis gracilibus, pendulis; ramulis semi-teretibus; foliis maturis alternatis, petiolatis, angusto-lanceolatis vel falcato-lanceolatis, 8–18 cm. longis, 6–20 mm. latis; inflorescentia in umbellis axillaribus 5–6 floris; floribus pedicellatis; alabastris cylindraneo-urceolatis, rugulosis; calycis tubo tenui, circiter 9 mm. longo; operculo conico vel rostrato, 4–5 mm. longo; antheris (*Macrantherae*) irregularibus, loculis lateralibus, longitudinaliter dehiscentibus; fructu ovoideo vel cylindroideo-urcolato, 7–10 mm. longo, 5–7 mm. in diametro.

A supposed natural hybrid with *E. cladocalyx* as one of the parents. A beautiful shaped tree, about 40 feet high, with slender, pendulous branches, and semi-terete, reddish-brown branchlets.

**Juvenile leaves** not seen.

**Mature leaves** alternate, petiolate, irregularly narrow-lanceolate to falcate-lanceolate, acuminate, sometimes terminating in a slender point 7–12 mm. long, light green and glossy on both surfaces, but usually paler beneath; venation not very distinct, except the median nerve, which is distinctly channelled above, flat and faintly channelled beneath, pale yellow or sometimes purple-brown; lateral veins few and distant, radiating at an angle of 20–30° with the midrib; intramarginal vein usually close to the slightly revolute margin, but sometimes rather distant from it, 8–18 cm. long, 6–20 broad; petioles slender, compressed-terete, 12–25 mm. long.

**Inflorescence** in axillary umbels of 5–6 pedicellate flowers; the peduncles slender, scarcely terete, 10–14 mm. long. Buds pedicellate, cylindrical-urceolate, rugulose, greenish-white; calyx-tube thin, about 9 mm. long; operculum conical to rostrate, 4–5 mm. long. Anthers (*Macrantherae*) very irregular, sometimes oblique on the filament as in *Terminales*, but the cells are lateral, either somewhat cordate or long and narrow, with or without a small terminal gland. Floral disc obscure; style moderately thick, with a dark-coloured capitate stigma.

**Fruit** ovoid to cylindroid-urceolate, slightly rugulose or sometimes quite smooth, usually with a small orifice and crowned with the slightly enlarged staminal ring, 7–10 mm. long, 5–7 mm. in diameter; valves deeply sunk. The fruits are somewhat like those of *E. cladocalyx*, but they are not so conspicuously costate.

This tree was brought under notice by Mr. P. R. H. St. John in 1921. The following is an extract from his letter :—"I send you specimens of an uncommon form of *E. cladocalyx*, which I found recently in a plantation some miles long, mainly of Sugar Gums, on Dr. Lang's Litanga Station, Lismore, Victoria. This form of *E. cladocalyx* is a beautiful tree, and is quite distinct from the rest of the trees in the plantation; the main difference being in the long narrow leaves and in the smaller fruits." Later Mr. St. John informed me (W.F.B.) that the tree was raised from seed in July, 1888, and is about 40 feet high. The origin of the seed is unknown.

Named in honour of Dr. P. H. Lang, "Litanga," Lismore, Victoria, who has taken a keen interest in the cultivation of *Eucalyptus*. Mr. St. John informed me (J.H.M.) that Dr. Lang has about 25 miles of *Eucalyptus* plantation, and in his house paddock there are over 100 different species.

## AFFINITIES.

1. With *E. cladocalyx* F.v.M.

It seems to be a well-marked natural hybrid of *E. cladocalyx*, with long, slender, irregular narrow-lanceolate leaves, and rather long rostrate buds and cylindroid-urceolate fruits. The anthers, however, are somewhat alike in both species, being very irregular as regards shape and size. Perhaps no other species has such variation in the anthers as the ones under discussion. No less than three or four different types of anthers can be found in the same head. Some are plump, with broad lateral cells, others are very narrow or uniformly oblong, while cordate or obcordate types are not uncommon. Occasionally the anther attachment is quite oblique, or it is sometimes attached to the side of the filament instead of at the top. Like *E. cladocalyx*, it does not appear to be a good oil-bearing species, and on that account it should make a useful tree for sheep and cattle fodder, especially in moderately dry areas.

2. With *E. calycogona* Turcz.

The unripe rugulose fruits resemble some forms of *E. calycogona*, and the leaves are also narrow, thin and channelled like the leaves of *E. calycogona*, but they are longer and there is a total absence of the characteristic oil-dots of *E. calycogona*.

## DESCRIPTION.

*CDXX. E. pygmaea* Blakely.*Journ. Roy. Soc., N.S.W., LXI, 149 (1927).*

**MALLEE** 2-6 pedes alta, caulibus aliquanto dense ramosis, ramulis quadrangularibus; folia juvenilia glabra, sessilia, elliptica vel ovata; folia matura alternata, petiolata, falcato-lanceolata, obscure viridia; gemmæ parvæ, cylindroido-clavatæ, obtusæ; antheræ reniformes; capsulæ sessiles, depresso-globulares, 8 x 10 mm.

A Mallee-like shrub, 2-6 feet high, with somewhat densely branched stems, and quadrangular branchlets; juvenile leaves glabrous, sessile, elliptical to ovate; adult leaves alternate, petiolate, falcate-lanceolate, dark green; buds small, cylindroid-clavate, obtuse; anthers reniform; fruit sessile, depressed-globular, 8 x 10 mm.

A shrubby Mallee-like Stringybark, 2-6 feet high, with short branching stems  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. in diameter. Branchlets reddish, more or less quadrangular and sulcate, caused by the decurrent petioles.

**Juvenile leaves** glabrous, the first or lowest pair opposite, sessile or shortly petiolate, elliptical to broadly ovate, 5-10 cm. long, 3-9 cm. broad; veins distinct, the lateral ones more or less bifurcate, intramarginal vein distant from the edge. Internodes densely hispid with stellate hairs.

**Intermediate leaves** alternate, petiolate, obliquely-lanceolate, thick, coriaceous, venulose, 7-15 cm. long, 4-10 cm. broad; lateral veins distinct, often broken or irregular, spreading at an angle of 50-60° with the midrib, and uniting with the undulate intramarginal nerve 3-4 mm. from the thickened nerve-like margin.

**Adult leaves** alternate, petiolate, falcate-lanceolate to obliquely-lanceolate, with a long straight or uncinate point; usually a dark glossy green on both surfaces, 4-11 cm. long, 2-3 cm. broad, venulose, but the veins more conspicuous on the lower surface, the median nerve usually reddish and channelled above; lateral veins diverging at an angle of 50-60° with the midrib; the intramarginal vein closer to the margin on the lower half of the lamina than on the upper half.

**Inflorescence** in simple axillary umbels on compressed peduncles, 10-13 mm. long, 3-4 mm. broad. Buds 8-15 in the head, sessile, yellowish, cylindroid-clavate, obtuse, slightly angular. Calyx-tube funnel-shaped or obconical; operculum blunt, hemispherical, much shorter than the calyx-tube.

**Fruit** sessile or nearly so, 8 x 10 mm., depressed globular, with a thick prominently raised disc nearly as deep as the calycine portion and usually reddish, three or four-celled, the small deltoid enclosed valves deciduous.

## RANGE.

It seems to be restricted to a small area, about an acre in extent, on the top of a gravelly sandstone plateau, a little south of the 17-mile post between Hornsby and Galston, about 24 miles north by rail from Sydney; near Kuring-gai railway station, New South Wales. Further extensions of its range may be looked for in somewhat similar situations, as the same class of country on which it grows extends for many miles along the coast range, both north and south of the localities indicated above.

In company with Mr. D. W. C. Shiress I found this species in June, 1914, but could only obtain specimens of juvenile and intermediate leaves as it was just recovering from the effects of a bush fire.

We paid several visits to the spot at different intervals, and succeeded in obtaining buds and fruits in June, 1922. Shortly afterwards it was again burnt down, and again two years afterwards, when there was a good prospect of obtaining additional material.

---

## AFFINITIES.

### 1. With *E. Camfieldi*, Maiden.

I had several good opportunities of studying these species, as they grow side by side in small communities, and are somewhat similar in habit, being dwarf and Mallee-like, but they are entirely different in the shape of their juvenile leaves. The early leaves of *E. Camfieldi* are cordate and closely sessile, and remain opposite for an indefinite number of pairs, whereas the juvenile leaves of *E. pygmaea* are elliptical, shortly petiolate, and opposite for two or three pairs; they are also much broader than those of *E. Camfieldi*. But the latter species exceeds the former in height and density of growth; it sometimes grows into small individual round-headed trees up to 12 feet high, with a stem diameter of 3-6 inches. The buds of *E. Camfieldi* are more globular than those of *E. pygmaea*, but the fruits are very much alike both in size and shape.

### 2. With *E. capitellata* Sm.

The juvenile leaves of both species are not very dissimilar. On the whole those of *E. capitellata* are the coarser of the two, while the buds are also larger and more angular. The fruits are also larger and compressed to a greater degree than the fruits of *E. pygmaea*. On the other hand, *E. capitellata* is a tree, while *E. pygmaea* is a small bushy Mallee.

## DESCRIPTION.

*CDXXI. E deformis* Blakely.*Jour. Roy. Soc., N.S.W., LXI, 152 (1927).*

**STRINGYBARK** Mallee vel arbor parva deformis, 6–25 pedes alta, 2–9 uncias in diametro; cortex laxe fibroso-intricatus; folia juvenilia opposita vel alternata, cordata, lanceolata, sessilia vel breviter petiolata, fere glabra, leviter crenulata, 2·5–6 x 1·7–4·5 cm.; folia matura alternata, petiolata, obliquo-falcato-lanceolata, 6–14 x 1·3 cm.; inflorescentia umbellis axillaribus 5–14 florum, gemmæ subsessiles, cylindracæ, acutæ vel rostratæ, 7–8 x 3 mm.; antheræ reniformes; stylus teres, subulatus; capsulæ hemisphæricæ ad fere globulares, subsessiles, 7–8 x 4 mm.; discus convexus admodum crassus.

A Mallee, or a small somewhat deformed or badly-shaped Stringybark, 6–25 feet high, 3–9 inches in diameter, usually growing in moist, shallow sandstone depressions, and on damp stony plateaux and low ridges. Bark loosely matted-fibrous on the stem and main branches, the smaller branches less fibrous and usually dark-coloured.

**Juvenile leaves** cordate to lanceolate, sessile to shortly petiolate, only the first two or four pairs opposite, or sometimes an occasional pair may be opposite amongst the alternate ones, glabrous, except for a few glandular hairs along the midrib, dark green, the margins slightly crenulate, 2·5–6 cm. long, 1·7–4·5 cm. broad; lateral veins not numerous, usually somewhat prominent beneath, diverging at an angle of 40–50° with the midrib; intramarginal vein distant from the edge. Stems scabrous with stellate hairs for 6–12 inches, then smooth.

**Intermediate leaves** alternate, petiolate, oblong-ovate to obliquely lanceolate, mucronate, glabrous, dark green, 5–8 cm. x 2–6 cm.; veins somewhat obscure, the lateral ones spreading at an angle of 50–60° with the midrib; intramarginal vein undulate, usually distant from the thickened nerve-like margin.

**Adult leaves** alternate, petiolate, obliquely lanceolate, or falcate-lanceolate, thick, coriaceous, dark green, glossy, 6–14 cm. x 1–3 cm. Venation penninerved, usually distinct; lateral veins diverging at an angle of 35–40° with the midrib, the median nerve very distinct on both sides, and usually closer to the lower margin; intramarginal vein usually very close to the edge.

**Inflorescence** in axillary umbels, the peduncle compressed, 5–7 mm. long, supporting 5–14 smallish flowers. Buds elongated, acute, to slightly rostrate, sessile or nearly so, somewhat angular at the base, 7–8 mm. x 3 mm. Operculum conoid or rostrate, as long as or longer than the narrow funnel-shaped calyx-tube. Filaments not numerous, white, many of the upper ones straight in the bud or before the operculum falls, and nearly as long as the terete, subulate style. Anthers small, reniform.

**Fruit** sessile or very shortly pedicellate, hemispherical to nearly globular, 7–8 x 4–6 mm.; disc usually prominent, forming a rather broad, smooth, slightly convex band around the small orifice; valves small, scarcely exsert.

**Timber.**—The trees are small and usually hollow, and produce a very pale brown, hard and durable timber, but it is so small that it is of little use except for fuel and mine props.

## RANGE.

So far it has been found only on the rough sandstone country south and north of the Lower Hawkesbury River, New South Wales, and is very common from Berowra to the Hawkesbury on the southern side, while on the northern side it extends as far as Penang Range, Gosford. It is very plentiful in the vicinity of Kariong trig. station, the type locality, which is roughly about 7 miles north of Brooklyn. (D. W. C. Shiress and W.F.B.).

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## AFFINITIES.

### 1. With *E. eugenioides*.

From which it differs in being a Mallee or dwarf tree, in the broader and more glabrous suckers, and in the more sessile and thicker fruits.

### 2. With *E. agglomerata*.

The suckers of this species in the young state are softly hairy, while those of *E. deformis* are scarcely hairy; they are also smaller and they do not possess the putrid-like odour of *E. agglomerata*. The latter is also a large tree, whereas the former does not appear to exceed 25 feet in height, and the stem diameter is usually less than 12 inches.

### 3. With *E. globoidea*.

Both species have broad juvenile leaves, but those of *E. deformis* appear to be more cordate-lanceolate and more variable than the juvenile leaves of *E. globoidea*. The buds of the latter are also smaller than those of the former, and the operculum is also shorter.

The fruits of *E. globoidea* are also smaller and rounder than the fruits of *E. deformis*. There is also a marked difference in the habit of the trees; *E. globoidea* is a small to medium-sized, single-stemmed tree of good shape, while *E. deformis* is usually a Mallee or a badly-shaped tree. The former seems to prefer a clay soil, while the latter is strictly a sandstone species.

## DESCRIPTION.

*CDXXXII. E. aequans* Blakely.*Jour. Roy. Soc., N.S.W., LXI, 154 (1927).*

STRINGYBARK parva ad 10 pedes alta; cortex fibrosus; ramuli rubelli, compressi vel teretes, glandulari-scabrosi; folia juvenilia opposita vel alternata, ovata vel lanceolata, sessilia vel nonnumquam breviter petiolata; folia matura alternata petiolata, oblonga vel angusto-lanceolata, *aequilateralia*, uncinata; gemmæ in parvis umbellulis, sessiles, graciles, cylindroideæ, acutæ, 5-6 mm. longæ; antheræ reniformes; capsula sessilis, fere globularis, truncata, 3-4 cellis, 5 mm. longa, 6 mm. diametro.

A small Stringybark up to 10 feet high, sometimes branching at the base, and with the same general appearance of *E. Moorei*. Bark somewhat flat and flaky-fibrous on the stem, more or less smooth and of a dull greenish-grey colour on the branches. Branchlets reddish, at first compressed, but soon becoming terete, and more or less glandular-scabrous. Young tips somewhat metallic, of a bluish cast.

**Juvenile leaves** ovate-lanceolate to lanceolate, only the first two or three pairs opposite, sessile to shortly petiolate, glabrous except the revolute, minutely glandular denticulate margins, pale green above, dark green and glandular-scabrous beneath, 2-4.5 cm. long, 1-1.5 cm. broad. Venation penninerved, somewhat obscure, the median nerve slightly convex beneath, compressed or slightly channelled above; lateral veins very fine, scarcely visible on the upper surface, the intramarginal vein close to the edge. Stems and internodes reddish-brown, scabrous with numerous glands tipped with microscopic stellate hairs.

**Intermediate leaves** not seen in a fully developed state, alternate, shortly petiolate, lanceolate to obliquely-lanceolate with acuminate points, up to 5 cm. long, 2 cm. broad.

**Adult leaves** alternate, somewhat rigid, oblong to narrow-lanceolate, usually terminating in a fine uncinata point and gradually diminishing at the base into a rather short, slightly compressed petiole, thick, coriaceous, flat, *aequilateral* and glossy on both sides, somewhat scabrous, with numerous, more or less conspicuous oil-glands, 3.5-8.5 cm. long, 7-13 mm. broad. Venation penninerved somewhat obscure, the median nerve faintly canaliculate on both surfaces; lateral veins sometimes more or less distinct, not more than three or four prominent ones on each side of the midrib and usually radiating at an angle of 10-20° with the median nerve, the intramarginal vein usually distant from the nerve-like margin.

**Inflorescence** in short axillary umbels of 5-9 small sessile flowers; peduncle compressed or almost terete, glandular scabrous, slightly dilated at the top, 4-5 mm. long. Buds sessile or nearly so, slender, cylindroid, acute, 5-6 mm. long, about 2 mm. in diameter. Calyx hyprocateriform rather thick, slightly longer than the acutely conoid glossy operculum; filaments not numerous, nearly all antheriferous. Anthers reniform, with broad cells and a very small terminal gland.

**Fruit** sessile, almost globular, truncate, with a somewhat slightly convex disc, 3-4 celled, the very short deltoid valves enclosed or sometimes slightly protruding beyond the broad orifice, 5 x 6 mm.

Fertile seeds black, obliquely pyramidal to somewhat navicular bi- or tricostate on the face, the dorsal surface smooth and striate. Hilum terminal, small, whitish, 2-2½ mm. x 1-2 mm. Sterile seeds light brown, granular, striate, usually smaller than the fertile seeds.

This species has remarkably uniform and equal-sided leaves for a Stringybark, hence the specific name.

## RANGE.

Only known from King's Tableland, Wentworth Falls, Blue Mountains, N.S.W., where it grows in association with other small species, such as *E. Moorei*, *E. ligustrina*, and *E. stricta*. (D. W. C. Shiress and W. F. Blakely, May, 1921; D.W.C.S., January, 1924.)

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## AFFINITIES.

### 1. With *E. ligustrina* D.C.

Both are dwarf species, but *E. æquans* seems to differ from *E. ligustrina* in every character except in the shape of the fruits. The small dainty cordate juvenile leaves of *E. ligustrina* are very dissimilar from the lanceolate juvenile leaves of *E. æquans*.

### 2. With *E. Kybeanensis* Maiden and Cabbage.

This is also a dwarf species, with narrow leaves, but the buds are almost globular and not cylindrical and acute like the buds of *E. æquans*.

The fruits of the latter are also smaller and thinner than those of the former.



## DESCRIPTION.

*CDXXXIII. E. globoidea* Blakely.*Jour. Roy. Soc., N.S.W., LXI, 157 (1927).*

**STRINGYBARK** parva 20-50 pedes alta; cortex stipis crassus, fibrosus, persistens, ramis glabris; folia juvenilia alternata, obliquo-lanceolata, vel falcato-lanceolata, tenuia, 6-12 x 1.5-4.5 cm.; inflorescentia umbellis simplicibus axillaribus 6-16 florum; gemmæ cylindricæ, acutæ, calyx obconicus; operculum conicum, acutum vel rostratum, 8 x 3 mm.; antheræ reniformes; capsulæ hemisphæricæ, in parvis globularibus capitibus congregatæ, ad 15 mm. diametro.

A small to medium-sized Stringybark, 20-50 feet high, with a short, straight stem and spreading branches, which give the tree a round-headed appearance. Bark rather thick, fibrous, a typical Stringybark; branchlets semiterete.

**Juvenile leaves** not seen in the earliest stage, alternate, ovate, lanceolate, shortly petiolate, glabrous or nearly so, 2.5-5 cm. long, 1.5-2.5 broad, cm. broad or broader, rather thick, smooth, with entire margins. Venation somewhat obscure.

**Intermediate leaves** alternate, rather broad, petiolate, oblong, elliptical to obliquely-lanceolate, acute or mucronate, smooth and shiny on both sides, 5-8 cm. long, 3-5 cm. broad. Venation somewhat prominent, the median nerve conspicuous on both surfaces, the lateral veins rather numerous, diverging at an angle of 40-50° with the midrib; intramarginal vein very remote from the edge.

**Adult leaves** alternate, very variable, broad to narrow-lanceolate, or obliquely-lanceolate, to falcate-lanceolate, thin, coriaceous, shiny on both surfaces, 6-12 cm. long, 1.5-4.5 cm. broad. Veins distinct, the lateral ones very slender, radiating at an angle of 30-50° with the midrib, the intramarginal vein distant from the edge in the broad leaves, rather close to the margin in the narrow ones.

**Inflorescence** in simple axillary umbels, the peduncle rather slender, sometimes very short, supporting 6-16 flowers. Buds tip-cat shaped, acute or slightly obtuse, including the short pedicels about 8 mm. long, 3 mm. in diameter. Calyx funnel-shaped; operculum acutely conical, as long as or longer than the calyx-tube. Anthers reniform with rather narrow cells and a small terminal gland in front.

**Fruit** hemispherical or nearly so, rather small, usually in dense globular heads, up to 15 mm. in diameter, pale-coloured, except the smooth, reddish-brown slightly convex disc, 5-6 x 7-8 mm., the cells very small, usually 4, with minute deciduous valves.

**Timber** pale, almost white, free in the grain, and to all appearance as strong as the timber of *E. eugenoides*.

**Illustrations.**—It is depicted in Part VIII of this work, under *E. capitellata*, Plate 38, figs. 7a, 7b. The type. Also under *E. eugenoides*, Plate 40, figs. 14a, 14b, 14c, 15a, 15b, 15c. Fruit more globular than the preceding.

## RANGE.

In the present state of our knowledge it appears to be confined mainly to the coastal districts and southern tablelands of New South Wales. The following are the localities :—Bermagui (W. Hutchinson); Mt. Imlay, near Eden. "One of the few Eucalypts found on the summit of the Mount." It reaches to but a small tree on the top, but at the base of the Mount and some distance from it, the trees become normal, or average about 50 feet high (J. L. Boorman, Kangaloon); "Stringybark saplings" (J. L. Bruce). Between Eden and Brown Mountain (C. C. Robertson and W. A. W. de Beuzeville). The juvenile leaves are broad and of a very dark green.

Illawarra (Rev. Dr. W. W. Woolls); Wingello (J. H. Maiden J. L. Boorman, and A. Murphy); Marulan (A. Murphy); Berrima (J. H. Maiden, J. L. Boorman, D. W. C. Shiress); Cutaway Hill, Mittagong (D. W. C. Shiress and W. F. B.). Co-type; Mount Colah (W. F. B.); Asquith (W. F. B.); Wyee (A. Murphy); Wallsend (J. L. Boorman, and J. W. Froggatt); Booral (A. Rudder); Glen Innes (per Forestry Commission).

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## AFFINITIES.

### 1. With *E. eugenioides* Sieber.

It appears to be a smaller tree than *E. eugenioides*, with broader juvenile and adult leaves, the former leaves are also less stellate-hispid in the sucker stage, while the fruits are sessile and usually form small globular masses in contradistinction to the lax fruiting habit of *E. eugenioides*.

### 2. With *E. agglomerata* Maiden.

Both species have broad juvenile leaves and conglomerate fruits, but the juvenile leaves of *E. globoidea* are smaller and more glabrous than those of *E. agglomerata*, while the fruits are smaller and relatively more uniform than the fruits of the latter species. It is also a much smaller tree than *E. agglomerata*. The seedlings are also smaller, and slightly more crinkled than those of the latter species.

## DESCRIPTION.

*CDXXIV. E. Bottii* Blakely.*Jour. Roy. Soc., N.S.W., LXI, 163 (1927).*

ARBOR admodum magna, cortice caulis aspero plus minus rugoso, cortice ramorum glabro; folia juvenilia subglauca, lanceolata vel oblique lanceolata; folia matura falcato-lanceolata, undulata; gemmæ parva, rostratæ; antheræ reniformes; capsulæ ovoidæ, glandulari-rugosæ, 9 x 8 mm.

A moderately large tree, 50 to over 100 feet high, with rough, more or less deeply furrowed bark on trunk, smooth on the branches; juvenile leaves subglaucous, lanceolate to obliquely lanceolate; adult leaves falcate-lanceolate, undulate; buds small, rostrate; anthers reniform; fruit ovoid, glandular-rugose 9 x 8 mm.

**Juvenile leaves** opposite for 3-6 pairs, slightly glaucous and somewhat rough with numerous oil-glands, lanceolate to obliquely lanceolate, shortly petiolate, very thin, dark green above, pale beneath, 4-7 cm. long, 2½-4 cm. broad; venation moderately distinct on both surfaces, but more prominent beneath, lateral veins diverging at an angle of 50-60° with the midrib, and uniting with the intramarginal vein a short distance from the edge.

**Intermediate leaves** alternate, slightly more glaucous than the juvenile leaves, and particularly the internodes which are glaucous to pruinose, green above, much paler beneath, broadly elliptical to obliquely-elliptical, or the upper ones obliquely-lanceolate, undulate with a short, terete glandular petiole, 9-16 cm. long, 5-9 cm. broad, venation distinct, the lateral veins rather distant, rising at an angle of 40-60° with the midrib; intramarginal vein very irregular; in some places it is close to the margin, in others 10 mm. from it, and when the latter there is a rudimentary or very fine secondary intramarginal vein between it and the minutely crenulated margin.

**Adult leaves** alternate, petiolate, falcate-lanceolate to obliquely-lanceolate, undulate, somewhat thick, coriaceous, smooth on both surfaces and with a very fine obscure venation, 6-16 cm. long, 1-3 cm. broad, the midrib slightly raised beneath, finely canaliculate above; lateral veins very fine, radiating at an angle of about 30-40° with the midrib; intramarginal vein a short distance from the slightly revolute margin. Petioles often twisted, glandular-rugose, convex beneath, channelled above.

**Inflorescence** axillary usually in simple umbels, but sometimes in short panicles. Umbels usually dense, the common peduncle compressed, 10-17 mm. long, bearing seven to over twenty pedicellate flowers. Buds pedicellate, small, rostrate, the calyx-tube obconical, thin minutely glandular-rugose, about 4 x 3 mm.; operculum conical but usually acutely rostrate up to 4 mm. long, striate on the inside; pedicels about 5 mm. long. Anthers reniform, the white filaments all fertile. Style subulate, more than twice the length of the calyx-tube.

**Fruit** pedicellate, forming ball-like masses up to twenty in the head, ovoid, glandular-rugulose. the small orifice surrounded by a rudimentary disc, the very small valves enclosed or sometimes flush with the edge of the disc, 9 x 8 mm. Pedicels subterete, rugose, 4-5 mm. long.

**Timber** with a rather thick sapwood, pale brown when freshly cut, slightly gummy, moderately hard and with a more interlocked grain than the timber of *E. piperita*. It appears to be a superior timber to that of the latter species.

Named in honour of Harold Bott, my friend and companion on many botanical excursions during the last fourteen years.

## RANGE.

So far it appears to be confined to a small area of the coast districts of the counties of Cumberland and Northumberland, at no great distance south and north of Sydney, N.S.W.

The following are the localities :—

Between Stanwell Park and Otford, large spreading tree with slightly glaucous undulate adult leaves (W.F.B.); Oatley and National Park (J. H. Camfield, April, 1901); the fruits from Oatley are slightly larger and thicker than the type; Gladesville (H. Deane, June, 1886); Cedar Gully, Cowan; tall, straight trees, up to 100 feet high and 2 feet in diameter, growing in association with *E. agglomerata* on rich clay soil (Bott, Shiress and Blakely); at the foot of Mt. Penang and along the old Penang-road for some distance; also in Kendall's Glen, which is on the left of the Penang-road going west from Gosford; trees 50 to over 100 feet high, somewhat like *E. pilularis* in appearance, with straight boles covered with a rather thick, grey Peppermint-like bark extending to the base of the large branches on moderately small trees, and on old trees extending to the small branches. The top portion of very young saplings is somewhat pruinose like those of *E. Sieberiana*, and the leaves are large, slightly glaucous, and distinctly undulate. At one spot it is ecologically associated with *E. paniculata*, *E. pilularis*, *E. saligna*, and *Angophora intermedia*. Very old trees of *E. Bottii* are markedly like old tree of *A. intermedia*, both in general appearance and in cortical characters. The rough, grey bark of the former persists well out on the branches like the bark of the *Angophora* (W.F.B., H. Bott, and D. W. C. Shiress); between Teralba and Fassifern, also about one mile south of Awaba (W.F.B.); Narara, on the edge of the brush (W.F.B., D.W.C.S., and A. Murphy).

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## AFFINITIES.

### 1. With *E. piperita* Sm.

It is quite obvious that there are imperceptible gradations between *E. Bottii* and *E. piperita* and its allies, but the main difference between them is in the superior size, and more shaft-like habit of *E. Bottii* with its relatively better timber; in the broader subglaucous juvenile and intermediate leaves, as compared with the very thin light green leaves with their pale undersurface of *E. piperita*; and in the slightly pruinose

bloom of the very young saplings of the former, and also with its more rostrate buds, and less urceolate thick fruits. *E. Bottii* seems also to prefer a better class of soil, and low-lying land with a porous subsoil, whilst *E. piperita*, almost without exception, sticks to the well-drained, rugged sandstone country, particularly with a southerly aspect, thus indicating that it prefers the cool side of the hills; at times it descends into the deep gullies until it meets with the shale which seems to be a barrier to its progress.

2. With *E. pilularis* Sm.

Young saplings of *E. Bottii* are tall and straight, and somewhat difficult to distinguish from saplings of *E. pilularis*, with which it is often associated, and they are sometimes cut for the latter species. The timber of *E. Bottii* is darker than that of *E. pilularis*, and much shorter in the grain. The adult foliage is also narrower and more glaucous than that of *E. pilularis*, while the juvenile leaves are very broad in comparison with those of *E. pilularis*.

## DESCRIPTION.

*CDXXXV. E. Robertsoni* Blakely.*Jour. Roy. Soc., N.S.W., LXI, 167 (1927).*

ARBOR permagna ad 180 pedes alta, 1-6 pedes diametro metrens; cortex stispis dense fibrosus atque intertextus; rami glabri; folia juvenilia opposita, angusto-vel late-lanceolata, acuminata, sessilia nunc amplexicaulia, parvum glauca, 1.5-10 cm. longa, 9-30 mm. lata; folia matura alternata, petiolata, angusto-vel late lanceolata, tenuia, exsiccata, viridi-glauca, 7-17 cm. longa, 1.5-3 cm. lata; pedunculi axillares fulcientes 9-21 parvos flores; gemmæ pedicellatæ, clavatæ vel rostratæ; antheræ reniformes; capsulæ hemisphæricæ vel pyriformes, truncatæ, pedicellatæ 5-7 x 5-6 mm., disco obliquo vel horizontali, valvis parvis, inclusis.

A large tree up to 180 feet high, up to 6 feet in diameter. Bark close, not ribbony (Robertson), of the Peppermint type, branches usually smooth. Young branchlets compressed, but becoming terete with age, usually of a reddish-brown colour or sometimes slightly pruinose. Leaves a pale slaty-green, usually with reddish veins and veinlets.

**Juvenile leaves** opposite for an indefinite number of pairs, narrow to broad-lanceolate, a few oblong-lanceolate, acuminate, sessile to stem-clasping, a much darker green above than on the under surface, invariably drying a pale slaty-green colour, 1.5-10 cm. long, 9-30 mm. broad or broader; venation moderately distinct, the median nerve very prominent beneath, usually of a reddish-brown colour and somewhat thickened at the base, very fine and channelled above; lateral veins very fine, scarcely raised above the surface of the lamina, radiating at an angle of 30-40° with the midrib, and with numerous fine secondary veins; intramarginal vein usually distant from the edge. Oil dots very numerous, the larger ones less numerous than the small ones. Internodes terete, glandular, reddish-brown.

**Intermediate leaves** alternate, shortly petiolate, narrow to broad-lanceolate or falcate-lanceolate, acuminate, oblique or rounded at the base, drying a pale slaty-green on both surfaces, 3-10 cm. long, 1-4 cm. broad; venation somewhat similar to that of the juvenile leaves; secondary veins diverging at an angle of 30-40° with the midrib.

**Adult leaves** alternate usually with slightly compressed petioles, 1-2.5 cm. long, narrow to broad-lanceolate, obliquely-lanceolate and falcate-lanceolate, thin, drying a pale slaty-green, 7-17 cm. long, 1.5-3 cm. broad; venation sometimes very distinct, the median nerve reddish-brown, slightly raised on both surfaces towards the base, or sometimes faintly canaliculate above; lateral veins numerous, diverging at an angle of 20-30° with the midrib, usually much branched and unequal in length; intramarginal vein very irregular and sometimes well removed from the margin owing to the abbreviated lateral veins; oil-dots conspicuous, very numerous.

**Inflorescence** in axillary umbels, the peduncle compressed, supporting 9-21 small pedicellate flowers. Buds clavate to rostrate, glandular, slightly glaucous, including the usually filiform pedicel 6-9 mm. long, about 3 mm. in diameter. Calyx-tube funnel-shaped; operculum conical to rostrate or acuminate, sometimes longer and broader than the calyx-tube. Anthers reniform with rather broad lateral cells and a fairly large terminal gland.

**Fruit** clavate to pyriform, occasionally somewhat mallet-shaped, truncate, smooth or more often slightly rugose, pedicellate, sometimes the pedicels filiform as in *E. numerosa*, 5-7 mm. long, 5-6 mm. in diameter; disc oblique or forming a flat broadish band over the very small enclosed valves, cells usually three.

**Timber** pale, with a slight pink tinge when fresh, changing to a very pale yellowish-brown when dry, moderately light with a fairly long, somewhat open grain, interspersed with short gum veins. It is fairly fissile and apparently not suitable for heavy work, and in this respect is inferior to Blackbutt, *E. pilularis*, but is a far superior timber to *E. numerosa* and *E. radiata*.

Mr. C. C. Robertson, M.F., in "A Reconnaissance of the Forest Trees of Australia from the point of view of their cultivation in South Africa," page 169, states that "on the high mountains above Tumut, &c., it is a large tree up to at least 120 feet high and commonly 3 or 4 feet, sometimes 6 feet in diameter."

"The wood of this large timber tree on these mountains is regarded locally as good for buildings, including flooring and lining, and it is stated not to shrink or warp to any large extent. I even saw some good moulding of it which had kept its shape very well. It is a moderately light, strong wood, and is excellent and largely used for pick handles. It has gum veins, but not to a very serious extent. It has also been used for furniture. It is also said to be quite durable, and house-blocks of it are believed to have lasted forty years. A trial of it for railway sleepers has been arranged. I was told also in Victoria of this tree being considered durable, fence posts of it having lasted thirty-five years."

**Illustrations.**—It is figured in Part VI, Plate 29, under *E. amygdalina*, fig. 8a, juvenile leaves; 8b, fruits, from Munendel Hill, Victoria (A. W. Howitt). Also Plate 30, under *E. amygdalina* Labill. var. *numerosa*, var. nov. (1), and allies, fig. 3a, leaf; 3b, small fruits, from Lilydale, Victoria (A. W. Howitt); 4a, broad leaf; 4b, fruits, Darlimurla, Victoria (H. Deane). The late Mr. Maiden has a note: "This form undoubtedly shows affinity to var. *numerosa*."

Named in honour of Mr. C. C. Robertson, M.F., Forest Department, Pretoria, South Africa, who assisted in segregating this species from its allies.

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## SYNONYMS.

*E. amygdalina* of many authors, but not of Labill; *E. numerosa* Maiden (partim.); *E. Australiana* Baker and Smith (partim.); *E. phellandra* Baker and Smith (partim);

The late J. H. Maiden and Messrs. Baker and Smith referred certain specimens of *E. Robertsoni* to the above species, but they did not describe them.

## RANGE.

It appears to be confined to Victoria and New South Wales. In the latter State it is widespread throughout the high mountain ranges from the Victorian border to Canberra, and it extends northward to Mullion Creek, Orange district.

*Victoria*.—Lilydale (A. W. Howitt). Mount Macedon (W. S. Brownscombe). Boggy Creek, Buchan-road (J. H. Maiden). Stony Creek, Dargo (A. W. Howitt). "Peppermint," near the Big River on the new road between Omeo and Glen Wills. Up to 3 or  $3\frac{1}{2}$  feet in diameter (H. Hopkins). Bulgaback, North Gippsland (A. W. Howitt).

*New South Wales*.—Grows into large trees on granite and basalt, Laurel Hill (R. H. Cambage, No. 871). "Messmate," Tumut (Forest Ranger Meham). Gilmore, near Tumut (J. L. Boorman). "Tumut, at an elevation of about 3,500 feet" (C. C. Robertson and W. A. W. de Beuzeville, A. W. Howitt). Talbingo Mountain, Tumut district (A. W. Howitt, C. C. Robertson, and W. A. W. de Beuzeville). The type.

"One of our best timbers for all purposes. I have seen blocks of this timber taken out of the ground after thirty years and they were still in good condition. (This applies to ground on which it grows.) We use it largely locally for telephone posts, rough building and especially T. and G. flooring and lining, and also for railway sleepers. It is locally a very large and tall tree, often 150–180 feet high. It is generally a very useful timber" Batlow (W. A. W. de Beuzeville); also collected in the same district by A. W. Howitt, P. Murphy, W. Hutchinson, F. W. Wakefield and W. H. Austin. The last is labelled *E. Australiana* by Mr. R. T. Baker.

(Tumbarumba. "Tree with a fibrous, matted bark." Bishop J. W. Dwyer, No. 1,418, F. W. Wakefield, No. 9, J. Davis.) "Narrow-leaved Messmate." Attains a height of over 100 feet, and exceeds 4 feet in diameter. Is considered a fine timber, and is largely used for fencing purposes. It is almost solely used at Kopsen's factory for pick-handles. It would make fine furniture, as it takes a good polish and looks exceedingly well when worked into chairs and tables. Found throughout the mountainous parts of the district. Grows equally well along sides of gullies and tops and sides of hills." Tumbarumba (H. A. Timms). Yarrangobilly (A. W. Howitt). "Messmate," Yarrangobilly saw-mills (W. W. Gillespie, E. Betcher). Snowy River, near head of Murray (E. M. de Burgh). Mount Stromlo, and Condor Creek, Federal Territory (C. Weston). Bondi Mountain and Devil's River, Tantanoola Mountain (F. W. Wakefield).

The following are western localities, or its furthest point north of Gippsland, Victoria. Isabella River, Oberon to Burruga (F. W. Wakefield.) Paupong (F. W. W.). "Very tall tree, with comparatively thin stem, 2–3 feet diameter, usually much less. Bark of Peppermint nature. Timber straight in grain. Not plentiful." Glengowan, Upper Meroo (J. L. Boorman and A. Murphy). Mullion Creek, near Orange (R. H. Cambage).



## AFFINITIES.

1. With *E. numerosa* Maiden.

In botanical characters *E. numerosa* appears to be its closest affinity. In fact, it may be described as a rough-barked form of *E. numerosa*, possessing a more durable timber, larger and more glaucous juvenile leaves, and sub-glaucous adult leaves, also glaucous, and more pointed buds. The umbels appear also to have fewer flowers in the head, and the pedicels are usually slightly shorter than those of *E. numerosa*.

2. With *E. radiata* Sieb.

*E. Robertsoni* is a much larger and taller tree than *E. radiata*, possessing a better class of timber, and has larger and broader juvenile leaves, which are more glaucous than those of *E. radiata*, while the venation of the leaves is also different. On the other hand, the buds are more pointed and even rostrate, and the peduncle and pedicels are usually longer in *E. Robertsoni* than in *E. radiata*.

## DESCRIPTION.

*CDXXVI. E. multicaulis* Blakely.*Jour. Roy. Soc., N.S.W., LXI, 172 (1927).*

**MALLEE** parva erecta caulibus ramisque tenuibus; folia juvenilia sub-glauca, breviter petiolata, ovata vel elliptica; folia matura-excentia alternata, petiolata, lanceolata, vel falcato lanceolata, subviridia utrimque nitida; gemmæ globulares, pedicellatæ; antheræ reniformes; capsulæ pyriformes vel urceolatæ-truncatæ, disco parvo, plano, 6-9 x 5-8 mm.

A small erect Mallee, with slender stems and branches; juvenile leaves sub-glaucous, shortly petiolate ovate to elliptical; adult leaves alternate; petiolate, lanceolate to falcate-lanceolate, pale green, glossy on both surfaces; buds globular, pedicellate; anthers reniform; fruit pyriform to urceolate-truncate disc small, flat, 6-9 x 5-8 mm.

A Mallee, 6-20 feet high, with numerous slender whipstick or clothes-prop-like stems  $\frac{1}{2}$ -4 inches in diameter. Large-sized plants with a little rough, sub-fibrous bark on the lower part of the stems, the upper portion smooth and usually purple-brown in colour. Branchlets sub-terete to quadrangular.

**Juvenile leaves** alternate, glaucous, shortly petiolate, ovate, elliptical to somewhat cordate, apiculate, thickish, usually lustreless, 4-10 cm. long, 3-9 cm. broad; venation scarcely prominent, the midrib slightly convex beneath, canaliculate on the upper surface of the lamina; lateral veins rather numerous, spreading at an angle of 20-40° with the midrib; intramarginal vein distant from the slightly revolute margin.

**Intermediate leaves** alternate, broadly lanceolate to obliquely lanceolate, dull, slightly glaucous, the lateral veins somewhat more distant than in the juvenile leaves, diverging at an angle of 40-50° to the midrib, 7-12 cm. long, 4-7 cm. broad.

**Adult leaves** alternate, petiolate, obliquely-falcate to lanceolate, light green (not glaucous) drying a pale colour, glossy on both surfaces, coriaceous, copiously dotted with dark oil glands, the margins somewhat thickened, 6-12 cm. long, 1-3 cm. broad; venation somewhat longitudinal, the median nerve more or less obscure especially on the lower surface; lateral veins radiating at an angle of 65-80° with the midrib and much closer together than in the intermediate leaves; intramarginal vein not far removed from the edge. Petiole semi-terete and usually twisted.

**Inflorescence** in axillary umbels, the peduncle compressed, up to 15 mm. long, supporting 5-12 pedicellate flowers. Buds drum-stick like, including the trigonous pedicels 5-8 mm. long. Calyx-tube shaped like a wine-glass, about 2 mm. deep; operculum blunt, hemispherical, about 3 mm. in diameter; stamens white, not very numerous, attached to the inner edge of the calyx-tube or staminal ring in two or three closely-packed irregular rows, only the inner ones antheriferous and shorter than the outer ones. Anthers very small, reniform, with a large globular semiterminal gland in front. Style slender, subulate, not exceeding the top of the calyx-tube.

**Fruit** pyriform-truncate, to slightly urceolate, flat-topped or slightly convex, the small capsular disc growing well out towards the centre of the capsule and extending over the very small enclosed valves, or the latter rarely exsert, usually three-celled, 6-9 mm. long, 5-8 mm. in diameter,

## RANGE.

So far it appears to be confined to the Lower Hawkesbury, between Broken Bay and Gosford, New South Wales, and grows mainly on poor shallow moist sandstone slopes with a southerly or south-east aspect; head of the left arm of Patonga Creek, about  $1\frac{1}{2}$  miles beyond tidal water; Sugar Loaf, over the Woy Woy tunnel; Kariong Trig., 807 feet above sea level, and about 7 miles air-line from Broken Bay. The type locality. It extends from Kariong in a southerly direction for about  $1\frac{1}{2}$  miles on the south-east slope of two prominent ridges which are very little lower than the Trig., and in several places it forms pure stands one to several acres in extent. In one spot on the southern end of Kariong it is intermixed with *E. virgata*, but, as a rule, it prefers the slightly better and drier soil than the latter species, and it has not been observed to grow on the rocky precipitous slopes like *E. virgata* does in this locality. (W. F. Blakely, D. W. C. Shiress and H. Bott); head of Kendall's Glen, Gosford (W.F.B. and D. W. C. Shiress).

## AFFINITIES.

### 1. With *E. Sieberiana* F.v.M.

*E. multicaulis* might be called a Mallee form of *E. Sieberiana*, as it somewhat resembles it in botanical characters, but it never seems to grow into a tree like *E. Sieberiana*. Sometimes *E. Sieberiana* sends out several small saplings from the rootstock, but they resemble the typical form in every way except in manner of growth. But they are very dissimilar from *E. multicaulis* in the nature of the bark, which is thicker, harder, and more rugged on the lower portion of the trunks, while the bark of the upper is smooth, glaucous or pruinose, in contradistinction to the short, brittle, mealy-fibrous bark on the base of the stems of *E. multicaulis*, and the smooth, reddish or purple-brown bark on the upper portion. The juvenile leaves of *E. multicaulis* are smaller, thinner, and less glaucous than those of *E. Sieberiana*. It is common to find the juvenile leaves of the latter species 18 cm. long, and 10 cm. in diameter. The fruits of *E. multicaulis* are also slightly smaller and somewhat differently shaped to those of *E. Sieberiana*.

### 2. With *E. Consideniana* F.v.M.

This species is usually a medium-sized tree, and, so far as I am aware, it has not been known to form a Mallee-like growth like *E. multicaulis*. The bark of the two species is also dissimilar in texture, and there is a marked difference in the juvenile leaves and in the sculpture of the fruit of both species.

## DESCRIPTION.

*CDXXVII. E. Bleeseri* Blakely.*Jour. Roy. Soc., N.S.W., LXI, 175 (1927).*

BLOODWOOD, arbor mediocris; cortex caulis ramorumque glaber; ramuli compressi, mox teretes; folia matura alternata, petiolata, angusti lanceolata, acuminata; inflorescentia formans paniculam terminalem magnam, corymbosam; gemmæ ovoideæ, glabræ; antheræ versatiles; capsulæ cylindraceo-urceolatae, 1.5-2.5 x 1-1.2 c.m.

A moderately smooth, white-barked Bloodwood, up to 50 feet high. Bark at base thin-flaky, semi-persistent, whitish to pale reddish-brown. Branches smooth; the old bark, which is of a reddish-brown colour decorticates annually in small, thin flakes, leaving the branches and portion of the stem smooth and white. Branchlets at first compressed, sulcate, but soon becoming terete, usually of a reddish-brown colour.

**Juvenile leaves** very variable, the lower ones alternate, petiolate, orbicular to ovate, apiculatee scabrous and loosely pilose, 3.5-7 cm. long, 3-5 cm. broad. Venation somewhat transverse, almost obscure except the intramarginal vein, which is conspicuous at the base, and distant from the margin. Internode, compressed, sulcate, densely pilose with reddish hairs; young tips infested with purple-brown hairs. Upper juvenile leaves opposite for two or three pairs, then alternate, oblong to broadly lanceolate, petiolate, very scabrous, almost peltate, or an odd one peltate, very dull, with a few scattered hairs or seta, on the margin and midrib, 6-10 cm. x 2.5-7 cm., more or less aromatic when crushed. Venation somewhat transverse, moderately distinct, diverging at an angle of 65-75° with the midrib. Internodes compressed or terete, pilose.

**Intermediate leaves** opposite for two or three pairs, then alternate, petiolate, coriaceous, smooth and shining, slightly pale on the under surface, broadly oblong-lanceolate, undulate, 8-18 cm. long, up to 6.5 cm. broad. Venation transverse or nearly so, very fine, almost obscure, the median nerve rather broad, convex beneath, channelled above; lateral veins spreading at an angle of 75-80° with the midrib; intramarginal vein concealed by the thickened nerve-like margin.

**Adult leaves** alternate, petiolate, narrow-lanceolate to obliquely-lanceolate, acuminate, thin, light-green, glossy on both sides, 10-16 x 1-2 cm. Venation almost transverse, very fine, the median nerve reddish, compressed or scarcely raised above the lamina; lateral veins very numerous, radiating at an angle of 75-80° with the midrib; intramarginal vein indistinguishable from the thin nerve-like margin. Petiole slender, convex beneath, channelled above, 10-15 mm. long, 1-1.5 mm. in diameter.

**Inflorescence** forming large terminal compound umbels or corymbose panicles; partial umbels 3-6 flowered; flowers on slender, slightly dilated pedicels 15-25 mm. long. Buds somewhat ovoid, slightly acute, tapering into the pedicels, smooth, pale-coloured or reddish, straight or curved at the base like the bowl of a tobacco pipe, 10-13 x 6-8 mm. Calyx-tube obconic, moderately thick, 7 mm. long; operculum broadly conical, slightly rugose at the top, shorter than the calyx-tube. Filaments white; anthers versatile, rather large, the cells longitudinal, with a large oval dorsal gland.

**Fruit** obliquely cylindroid-urceolate, to oblong-urceolate, 1.5–2.5 cm. long, 1–1.2 cm. in diameter; the capsular disc fairly well developed, internally deeply oblique, the orifice considerably smaller than the expanded top of the capsule; valves deeply sunk, sometimes much lower than the base of the capsular disc.

**Timber** a very pale pink when fresh, with a moderately long straight grain, strong and tough, of medium weight.

**ILLUSTRATIONS.**—It is figured in Part LXIX, Plate 280, figs. 4–5.

## SYNONYM.

*E. terminalis* F.v.M. var. *E. longipedata* Maiden and Blakely, *Crit. Rev.*, Part LXIX, p. 407.

## RANGE.

In the present state of our knowledge, it seems to be confined to Port Darwin, Northern Territory, and was first collected by Schultz about 1880, who forwarded a specimen to the late Baron Von Mueller for identification.

It apparently had escaped the observation of many collectors who visited Darwin since the above date, until it was rediscovered by Mr. C. E. F. Allen, in March, 1917, who submitted a flowering specimen to the late Mr. J. H. Maiden, who asked Mr. Allen to supplement his specimen with ampler material, but the request was left in abeyance.

In February, 1927, Mr. F. A. K. Bleeser, of Darwin, pointed out the tree to Mr. D. W. C. Shiress, who brought back specimens which enabled me to establish its identity. Mr. Bleeser has also sent specimens, together with a sample of the timber, and field notes concerning it.

I therefore, name the species in honour of Mr. F. A. K. Bleeser, Assistant Postmaster, Port Darwin, who for upwards of thirty-eight years has taken a very keen interest in the flora and fauna of the Northern Territory.

## AFFINITIES.

1. With *E. terminalis*. F.v.M.

The buds and fruits of both species are somewhat similar in shape and size, but the long slender pedicel of either character of *E. Bleeseri* readily differentiates it from *E. terminalis*; the operculum is also longer and more pointed in the former. In the field the former may be distinguished from the latter by its moderately smooth white bark, in contradistinction to the rough bark of *E. terminalis*.

2. With *E. dichromophloia* F.v.M.

The buds and fruits of *E. Bleeseri* are larger than those of *E. dichromophloia*, while the bark of the former is comparatively smooth, not rough like that of the latter.

## DESCRIPTION.

*CDXXXVIII. E. Dielsii* Gardner.

In *Jour. Roy. Soc., Western Australia*, vol. xii, p. 67 (1925-26).

ARBOR pusilla, sive "Mallee, quindecim vel octodecim pedum altitudinis, e cortice plano-tenui, viridifusco et trunco quinque vel septem unciarum diametri. Ligno tenaci, recte granulato, duro, pallide, fusco, denso.

*Juvenilibus foliis* potius pallido-viridibus, parce petiolatis, tenuiter inæqualibus, pellucidis ex punctis oleosis, inconspicuis lateralibus venis angulum facientibus circiter 75 graduum cum costa centrali.

*Maturis foliis* denso-rigidis, anguste lanceolatis, tenuiter falcatis, vel fere rectis, petiolatis, idem color utrinque habentibus costa centrali prominenti venis lateralibus circiter parallelis angulum efformantibus circiter 40 graduum cum costa media, vena intramarginali remota a margine.

*Pedunculis* generaliter axillaribus, modice planis et curvatis, sub umbella expansis, quae consistit ex tribus vel quinque floribus. Pedicellis tenuibus, sursum incrassatis. Operculo conico, dilatato super lineam commissuralem; tubo calyceo modice campanulato, disco efformante calycis prolongationem atque in gemmatione constituenti annulo staminali. Antheris oblongis longitudinaliter aperientibus, albicantibus, filamentis in gemma inflectis. Stylo crasso breviori staminibus, cum capitato stigmate.

*Fructo* urceolato-globulari, abrupte imminuenti versus pedicellam; margine distincte definita, protrusa et reflexa ita ut suspendentum limbum formet, summitate formam cupulae habente, valvulis deltoidis magis minusve planis cum capsula.

Foliis 7-12 cm. longitudinis, 10-17 mm. amplitudinis. Pedunculis circ. 2.5 cm. long; pedicellis modice supra 1 cm. long. Operculo 1 cm. long, 8 mm. amplitudinis supra basim. Calyci 6 mm. long. Fructo 1.3 cm. long, idemque in diametro.

Nuncupatus in honorem L. Diels, illustris moderator Hortus Botanici apud Berlin, qui extense peragravit Australian occidentalem in principio hujus saeculi, quique tantum contulit historiae botanicae hujus regionis.

A small tree, or a Mallee of 15-18 feet, with a smooth, thin, greenish-brown bark, the trunk 5-7 inches in diameter. Timber tough, straight-grained, hard and dense, pale brown in colour.

**Juvenile leaves** rather dark green, shortly petiolate, slightly unequal, pellucid with dark oil-dots, the inconspicuous lateral veins making an angle of about 75 degrees with the midrib.

**Mature leaves** thick and rigid, shining, narrow-lanceolate, only slightly falcate or almost straight, petiolate, the lateral veins roughly parallel, and forming an angle of about 40 degrees with the midrib; the intramarginal vein removed from the edge.

**Peduncles** mostly axillary, slightly flattened and recurved, widening under the umbel, which consists of three to five flowers. Pedicels slender, thickened upwards. Operculum conical, widest some distance above the junction with the calyx-tube, acute. Calyx-tube ovoid-campanulate, the disc produced above the base of the operculum, forming a staminal ring covered by the operculum when in bud. Anthers oblong, the cells parallel, opening in longitudinal slits, white in colour, the filaments green, and inflected in the bud. Style thick, shorter than the stamens, with a capitate, somewhat large stigma.

**Fruit** urceolate-globular, abruptly tapering into the pedicel, the summit domed, with the rim well defined, protruding or even reflexed, the valves deltoid, more or less flush with the summit of the capsule.

**Leaves** 7-12 cm. long, 10-17 mm. broad. Peduncles about 2.5 cm. long; pedicels slightly over 1 cm. long. Operculum 1 cm. long, 8 mm. diameter in the widest part (*i.e.*, about one-quarter of the height). Calyx-tube 6 mm. long. Staminal ring 2 mm. long. Fruit 6 mm. long, and the same in diameter.

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## RANGE.

Habitat near Salmon Gums in the Coolgardie district, to the south of Dundas, Western Australia, in red clay soil, forming low forests with *E. diptera*, flowering January to April. The type is No. 1,051A, Herb. C. A. Gardner, and was collected by W. T. Brown, 13th January, 1925.

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## AFFINITIES.

The affinities of this species appear to lie with *E. erythronema* and *E. eremophila*, particularly with the var. *marginata* of the former. This is especially the case with the staminal ring, which is perhaps the floral disc. This projects above the commisural line, lining the operculum for some distance. This continuation of the disc remains erect in the flower like a continuation of the calyx-tube, but after flowering becomes reflexed and forms the remarkable rim of the domed disc of the fruit. Something of the kind is observable in *E. erythronema* var. *marginata*, but the ring remains erect.

From the collector's remarks it appears that *E. Dielsii* is much like *E. diptera* in habit, and the timber and barks are certainly very much alike.



## DESCRIPTION.

*CDXXXIX. E. Gilleni* Ewart and L. R. Kerr.

In *Proc. Roy. Soc., Vict.*, xxxix, 7 (1926), with fig.

A low, densely-branched shrub, spreading from the base, about 6-8 feet high, with a smooth bark on the branches, becoming rougher and more Box-like on the older stems, but not fibrous. Leaves shortly stalked with the petiole, usually twisted so as to place the lamina vertical, linear-ovate to lanceolate, bluntly pointed, thick, very coriaceous, pale green on both sides, intramarginal vein prominently developed, and frequently with a second, fainter, intramarginal vein nearer the edge of the leaf; lateral veins diverging at an angle of about 45°; young shoots angular, midrib red. Fruits shortly stalked, usually in clusters of three, occasionally in twos, or even single, and either on terminal leafless branches or on leafy shoots opposite the leaves, or in their axils; peduncles short, thick, and more or less angular; capsules sessile, almost globular, with an equatorial rim and a domed-shaped top with four, or less commonly three, short valves with flattened-incurved tips; seeds not winged.

The fruit somewhat resembles that of *E. macrorrhyncha*, but the bark is quite different. The nearest affinity appears to be *E. Oldfieldii*, but the general habit and the shorter, angular, common pedicel are distinctive features. Although the flowers have not been seen, the species appears to be quite distinct.

Juvenile leaves narrow ovate-lanceolate, pointed, shortly stalked, opposite and becoming alternate later; venation almost identical with the adult leaves, except that the intramarginal vein is thinner and single and the leaves less coriaceous than the adult; oil glands not numerous, but more prominent on the juvenile foliage. The plant is strongly xerophytic, and only grows, so far as is known, on the southern slope of Mt. Gillen, among the tufts of porcupine grass. It grows well in Melbourne, forming a rather graceful small shrub, but seems reluctant to flower.

Mt. Gillen, Northern Territory, July, 1924 (A. J. Ewart).

## AFFINITIES.

With *E. Morrisii* R. T. Baker.

The fruits appear to resemble those of *E. Morrisii* R. T. Baker. They are, according to the figure, ovoid, closely sessile; the peduncle is very short, scarcely half the length of the fruit. The leaves are broad-lanceolate and thick.

## DESCRIPTION.

CXXXVII. *E. alba* Reinwardt.

It is fully described and figured in Part XXV, p. 90, Plate 105, figs. 1-5, and need not be repeated here.

## RANGE.

The type came from Timor. It occurs also in Java, but its western limit in Malaysia is unknown, and it does not appear to extend to Australia, as stated in Part XXV. The localities quoted in the above Part are referable to *E. platyphylla* and *E. pastoralis*, which have been segregated from *E. alba*, see pp. 98 and 102.

## DESCRIPTION.

*CDXXX. E. platyphylla* F.v.M.

In *Jour. Linn. Soc.*, iii, 93 (1859).

IN Part XXV, p. 95, of this work I have written up this species as a synonym of *E. alba* Reinw., but I now regard it as a distinct species.

A Latin description will be found at p. 95, of which the following is a translation :—

Arboreal, with more or less terete branchlets; leaves alternate or sub-opposite with long petioles, ovate or cordate-orbicular, occasionally sub-rhombic, rarely ovate-lanceolate, opaque, prominently penninerved, pellucidly dotted, peripheric vein distant from the margin; umbels axillary or lateral, 3-7 flowered, the angular peduncles as long as the calyx-tube, the latter hemispherical, ecostate, and as long as the semi-globose, smooth and rounded operculum; fruits turbinate, hemispherical, with three or four compartments, slightly convex at the apex, valves attached to the margin, exserted.

*Habitat.*—In fertile pastures on the Burdekin River (Eastern tropical shores, A. Cunningham, Herb. Hooker). Flowers September and November.

A tree of moderate or large dimensions, bark of the trunk and branches smooth, soon whitening, the shedding outer layers thin and dark. Petioles semiterete, 1-1½ inches long. Leaves thinly coriaceous, usually 2-3 inches long, often abruptly tapering into the petiole, decurrent. Calyx-tube measuring 1½-2 lines. Operculum rather pale, simple (by which it may be distinguished from the similar *E. bigalerita*). Stamens 2-3 lines long, whitish. Capsules 2 lines long. Near to *E. bigalerita*. (*Journ. Linn. Soc.*, iii, 93, 1859.)

*Eucalyptus platyphylla* F.v.M. is called "Nankeen Gum," from the peculiar light brown colour of its bark. It is the "White Gum" of Queensland, where it has a different appearance to that in Northern Australia. "Deciduous Gum." The timber is poor.

"One thing which strikes the observer is the enormous size of the leaves of a small, scrubby Gum which grows close to the ground. It is no uncommon thing to see saplings with leaves a foot long, and half as broad. This is the young state of this species. It is the commonest Gum tree of all tropical Australia, and will grow on the poorest soil, but the leaves of the adult tree are not very large." (Tenison-Woods, "Explorations in Northern Australia.")

*Illustrations.*—It is amply depicted on Plate 106, figs. 3-6, also Plate 107, figs. 1-7. Fig 6 is portion of the type of *E. bigalerita* F.v.M. which appears to be conspecific with *E. platyphylla*.

## SYNONYM.

*E. bigalerita* F.v.M. This is referred to under *E. alba* in Part XXV, 96, where the original description is quoted in Latin, also Bentham's observations concerning it.

## RANGE.

It is for the most part tropical, and while on the mainland of Australia it extends over the north, from Queensland to the Kimberleys and North-western Australia generally, it descends a little south in Queensland, at least as far as Gladstone. It prefers moist grassy valleys, but is not exclusively confined to such areas.

*Papua*.—Port Moresby, Papua (Prof. W. Baldwin Spencer, W. S. Campbell).

*North-western Australia*.—Calder River, near junction of Lennard and Barker Rivers; Isdell River, near Mount Barnett Homestead (W. V. Fitzgerald). A Cabbage Gum of moist, sandy loam overlying sandstone and quartzite, Lennard River, near Lukin's Old Station, Carnley and Ord Rivers, Dillen's Springs (W. V. Fitzgerald). Mr. W. V. Fitzgerald speaks of *E. platyphylla* in North-west Australia as a "copious oil producer." The abundance of oil in this species is implied by the name "Kaju-puti" (Cajeput), applied to it in Malaysia in common with other trees also rich in oil. Banks of the Upper Drysdale River, near Mount Hann, in sandy soil in basaltic country, forming open savannah with *E. Spenceriana*, but never far from the river; from thence south-west in the direction of Mount Agnes in low-lying flat country, with the same associate tree. (Kimberleys, C. A. Gardner, No. 1566.)

*Northern Territory*.—Pine Creek Railway (E. J. Dunn). Islands of the Gulf of Carpentaria (R. Brown, quoted in *B.Fl.*, iii, 243).

*Queensland*.—"Bay of Inlets, Endeavour's River. Banks's specimens are not referred to by Bentham. Native name, 'Kaikur' (Botany of Cook's First Voyage, Banks and Solander (Britten), p. 38, p. 116)." Above is the label of a specimen.

Mr. Britten kindly gave me two specimens, one a Banksian one, corresponding to the Plate, and a second one practically identical, collected by Brown at Shoalwater Bay in 1802. It is labelled:—

"*Eucalyptus populifolia* Banks and Sol. and R. Br. MSS. *E. platyphylla* F.M. ex Benth. Shoalwater Bay, R. Brown, Sept. 2, 1802."

The name *populifolia* is one which at once arises when one views this tree, and it is not surprising that it was adopted by more than one botanist independently. It is the "Poplar Gum" of Leichhardt, who often refers to it in his "Overland Expedition . . . to Port Essington," *e.g.*, p. 142:—"In one of the glens along the ridges I observed a new Gum tree with a leaf like that of the trembling Poplar of Europe, and of a bright green colour, which rendered the appearance of the country exceedingly cheerful. It is a middle-sized tree, of irregular growth, with white bark, but the wood, not being free-grained, was unfit for splitting." "Considerable tracts were covered by the Poplar Gum" (p. 148). At p. 149 he named the Isaacs River, and I have seen a specimen of *E. platyphylla* which bears Leichhardt's label. "The Poplar Gum, which forms patches of forest along the Isaacs" (*sic.*). The Isaacs River is in Northern Queensland, approximately in 22-23° S. Lat., and 149° E. Long. ". . . tracts of fine open forest country, amongst which patches of the Poplar Gum forest were readily distinguished by the brightness of their verdure" (p. 153). "The Poplar Gum was more frequent, and we always found patches of fine grass near it, even when all the surrounding Ironbark forest was burnt" (p. 206). ". . . Narrow-leaved Ironbark and Poplar Gum grew on the hills, and rich grass everywhere" (p. 250). ". . . the left side (of the plain) being sandy and covered with a very pleasing Poplar Gum forest" (p. 253).

Following are additional localities for this species:—

"No. 252. In flat, swampy ground. Few in dry ridges. Middle size tree. Falling bark like in the *Platanus*. Old bark ashy colour; new, white-yellowish." This is a copy of A. Thozet's label on a Rockhampton specimen.

Grows on flat lands, moist clayey. Also found on the ridge at the Rockhampton cemetery (J.H.M.). Thirty miles north of Rockhampton (A. Murphy); "Red Gum," Crescent Lagoon, West Rockhampton (W. N. Jaggard).

Following is a note on *E. platyphylla* taken by me while standing in front of the trees at North Rockhampton, Queensland:—

"Poplar Gum. A Cabbage Gum. Timber will not split. Excellent firewood. An entirely smooth bark without flakes, a typical White or Cabbage Gum. Though not a very tall tree, it has a good trunk, although often scrambling. Branches brittle, common from Gladstone northward."

"A fairly common tree in the Rockhampton district, growing usually in moist, though not necessarily in swampy places. Large smooth-barked trees, having a pendulous habit, with large poplar-like leaves. Timber soft, red (when newly cut—J.H.M.) in colour, useless except for firewood, even this of poor quality." Yeppoon (J. L. Boorman). Thirty-eight miles west of Mackay, Pioneer River, and tree common about Mackay. The young leaves when dry were 12 inches long by 11 inches broad. "On full-grown tree the leaves are much smaller, and roundish in shape" (Sid. W. Jackson). Port Denison or Bowen (Dallachy); Pandanus Creek (E. B. Yearwood); "Many buds have double operculum when collected," Townsville (R. H. Cambage, No. 3,801) Reid River, near Townsville (N. Daley), "Poplar Gum," near Atherton and throughout the north. "Low stunted tree, spreading gnarled branches, while bark, timber grey, very gnarled grain" (H. W. Mocatta, District Forest Inspector) Atherton (E. Bêche). These specimens (in bud) are in no way different from those of *E. pastoralis*. Ten Mile, Stannary Hills (R. G. Shearer).

The following localities, not already enumerated, given in *B.Fl.*, iii, 243, may be taken in here :—

Fertile pastures on the Burdekin (Mueller). This may be regarded as the type. Percy Island (A. Cunningham); Broad Sound (Fitzroy); Bowen River (Bowman).

Dr. H. I. Jensen says :—

“*E. platyphylla* is widespread on the flats throughout North Queensland. It is the typical Poplar Gum of the Northern Territory; grows on heavy grey clay soil. The dwarfed hill variety of *E. platyphylla*, which I regarded in the Northern Territory as a different species, has not been observed by me at all in North Queensland.” He adds that it is calciphile on heavy loams and heavy subsoil, from Central Railway, Queensland, to far north. It is mostly on alluvial and detrital flats, associated with *E. terminalis* and *E. grandifolia*.

## AFFINITIES.

With *E. alba* Reinw.

*E. platyphylla* seems to possess the same cortical characters of *E. alba*, but differs somewhat in size and habit, and on the whole is a smaller and more scrambling tree than *E. alba*. The adult leaves are also much broader, while the buds are almost sessile and more globular, and the fruit is usually thicker, with strong, exerted valves, and invariably possesses the characteristic short, thick, pedicel.

Bentham, in *B. Fl.*, iii, 197, separates the species as follows:—

Leaves broad, with very diverging veins and distinctly reticulate.

Flowers nearly sessile or on short thick pedicels. Operculum hemispherical,  
short    ...    ...    ...    ...    ...    ...    ...    ...    ...    *E. platyphylla*.

Flowers small, distinctly pedicellate, operculum conical    ...    ...    ...    *E. alba*.

Mueller (“*Eucalyptographia*,” under *E. alba*) says :—

“*E. platyphylla* F.v.M., *Journ. Linn. Soc.*, iii, 93, approaches closely to *E. alba*; the leaves are mostly broader, the lid is generally shorter and blunt and the valves less exerted; its foliage sheds for short periods almost entirely. The range and variability of these trees remain yet to be further ascertained by extended field researches.”

## DESCRIPTION.

CDXXXI. *E. pastoralis* Spencer Moore.

*Journ. Bot.*, xl., 27 (1902).

IN Part XXV, p. 95 of the present work, I have placed *E. pastoralis* as a synonym of *E. alba*, and quoted the original description. As it appears to be a much larger flowered species than *E. platyphylla*, I think it had better be kept apart from that species until we know more about it.

Portion of the type is figured at Plate 105, figs. 8, 9. Fig. 7, from Port Darwin, is almost identical with fig. 9 from the Adelaide River, North Australia, the type locality for *E. pastoralis*. It will be seen, therefore, that it is not confined to one locality, and may have a much wider range than we are aware of at present.

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RANGE.

So far I have seen specimens from the following localities, all of which are in the Northern Territory :—

Port Darwin (Paul Foelsche). Nearly globular buds (see fig. 6*b*, Plate 105) Tree of 40 feet, banks of Katherine River, Northern Territory (C. E. F. Allen, No. 681). With slightly smaller buds than the type. Adelaide River (Rev. T. L. Lea). The type.

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AFFINITIES.

1. With *E. platyphylla* F.v.M. and *E. alba* Reinw.

In the original description Spencer Moore makes the following comparison :—

“Near *E. platyphylla* R.Br. and *E. alba* Reinw. The leaves are almost exactly those of the former, but in either case the buds and opercula are much smaller than those of *E. pastoralis* and differently shaped. At the British Museum there is a specimen, sent under the name of ‘*E. alba* Reinw.’ by Baron Mueller, which has large flowers with a broad, hemispherical, very obtuse operculum, almost exactly like that of *E. pastoralis*. This is altogether unlike typical *E. alba* Reinw., and may perhaps be a small-leaved form of the species described above.” (*Journ. Bot.* xl, 27, 1902.)

The buds are certainly distinct from those of *E. alba* and *E. platyphylla*, they are larger, more spherical, and thicker in texture than in either of the above species. The leaves of *E. alba* are also much narrower and more acuminate than those of *E. pastoralis* or *E. platyphylla*.

## DESCRIPTION.

CDXXXII. *E. tectifera* F.v.M.*Journ. Linn. Soc.*, iii, 92 (1859).

THE original description in Latin will be found at p. 95, Part XXV, of the present work, and may be translated as follows :—

Arboreal, branchlets slender rounded; leaves alternate, thinly coriaceous, rather shortly petiolate, ovate-lanceolate to narrow-lanceolate, narrowed for a long distance towards the apex, thin-veined, opaque, imperforate, the longitudinal vein closely approximate to the margin; umbels axillary, solitary or in terminal panicles; pedicels of the calyx angular, equal in length to the tube, but shorter than the common peduncle; operculum conical, acuminate, as long as the semiovate tube . . . Hab.—In grassy valleys of the McArthur River near its source. (N. Holl. Sub-Trop., Mitchell in Hb. Hook.). Flowers August and September.

A rather tall tree, bark pale ashy, rugose, persisting on the trunk and branches. Leaves 6 inches long, or nearly so, near the base  $\frac{3}{4}$ – $1\frac{1}{2}$  inch wide, primary veins spreading, secondary reticulate-anastomising. Flowers on the specimen collected not yet well developed. Peduncles slender, 2–3 lines long. Flower buds 2 lines long, in fuller development perhaps acute. Fruits wanting. The bark is employed by the aboriginals in the construction of their rude shelters.

In Part XXV, p. 95, I pointed out that Mueller evidently considered *E. tectifera* synonymous with *E. alba*, for he omits it from his second census without comment. Notwithstanding Mueller's decision, I am of opinion that *E. tectifera* is specifically distinct from *E. alba*. Although I have not seen a specimen of it, it is quite obvious to me, that if reliance can be placed in the original description, especially as regards the bark and buds—which appear to me to be totally different from those of *E. alba*—it is undoubtedly a rough-barked species, and its place seems to be among the Boxes, such as *E. Spenceriana* or *E. Hillii*, but its true position cannot be ascertained until the anthers are examined.

## RANGE.

So far it is only known from the Macarthur River, Northern Territory.

Leichhardt, in his "Overland Expedition . . . to Port Essington," p. 413, says :—"I called this river the 'Macarthur,' in acknowledgment of the liberal support my expedition received from James and William Macarthur on Camden." The Macarthur River runs (it is presumed, for the whole of its course has not been explored) into the south-western part of the Gulf of Carpentaria. In *Journ. Linn. Soc.*, iii, 92, specimens from the Upper Macarthur River (presumably collected either by Leichhardt



or Mueller) are referred to *E. tectifica*. But as regards the second specimen quoted in the original description, viz., "N. Holl. Sub-trop. Mitchell in Herb. Hook." Bentham (*B. Fl.*, iii, 243, under *E. alba*) says that "Mitchell's specimens, referred by Black in *Journ. Linn. Soc.*, iii, 92, to *E. tectifica*, belong to *E. dealbata*; the leaves of which sometimes assume the form of those of *E. alba*, but with a different venation." Therefore, only the Macarthur River specimen (the type) can be referred to *E. tectifica*.

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## AFFINITIES.

### 1. With *E. alba* Reinw.

*E. tectifica* was so called because "the bark of the Carpentaria tree (was) persistent and rough, as well on the branches as on the stem, though it is certainly pale outside, and is used by the aborigines there for constructing the rude roofs of their sleeping places." (Mueller in "Eucalyptographia," under *E. alba*.)

"*E. alba* has the leaves nearly equilateral, the almost hemispherical calyx-lid protracted into an umbonate apex, the capsules 3-4 celled, the valves barely semi-exserted, and the seeds wingless. The identity of *E. tectifica* with *E. alba* is not yet established beyond doubt." (Mueller, "Papuan Plants," i, 9).

*E. alba* is a smooth-barked tree.

### 2. With *E. platyphylla* F.v.M.

The rough, persistent bark of *E. tectifica* sharply separates it from *E. platyphylla*, while the leaves appear to be longer and narrower, and the buds more acute.

### 3. With *E. pastoralis* S. Moore.

This is also a smooth-barked species, while *E. tectifica* appears to belong to the Boxes. The leaves and buds of the former are also distinct from those of the latter.

## NOTES ON SUPPOSED HYBRIDS.

Are *E. Bourlieri*, *E. unialata* and *E. antipolitensis* conspecific?

For a description of *E. Bourlieri* and *E. antipolitensis* see this work Part LII, and for *E. unialata* see Part LI.

In *Proc. Roy. Soc., Tas.*, 1918, p. 89, I stated that I looked upon *E. antipolitensis* as being conspecific with *E. unialata* Baker and Smith, and I expressed the opinion that they both originally arose from a cross or crosses between *E. globulus* and *viminialis*, but whether they were really identical I preferred to suspend judgment. However, after again examining the evidence, I now think they are distinct and should be kept apart as hybrid species until we know more about them.

As regards *E. Bourlieri*, Dr. Trabut states that it appeared in a sowing of *E. globulus* (probably mixed seed, J.H.M.) at La Reghaia. Dr. Trabut does not state where the seed was obtained, but it is reasonable to suppose that it was of Tasmanian origin, as the species described as *E. unialata* Baker and Smith is very closely related to it.

*E. Bourlieri* was described in 1903, *vide* Part LII p. 75; *E. unialata* in 1912; and *E. antipolitensis* in 1917.

There are two more or less distinct forms of *E. unialata* in Tasmania, and *E. Bourlieri* comes very close to one form, and *E. antipolitensis* to the other. At the same time, neither *E. Bourlieri* nor *E. antipolitensis* agree entirely with *E. unialata*. All three species seem to be forms of one common species. Whether they are descendants of *E. globulus* it is difficult to say with any degree of certainty; but at all events there does appear to be some justification for assuming that *E. globulus* is one of the parents, and it is reasonable to suppose that *E. viminialis* is the other, as both species are sometimes associated in the field.

The juvenile leaves of *E. Bourlieri*, *E. antipolitensis* and *E. unialata* are somewhat alike, but on the whole they are smaller, thinner and less glaucous than the juvenile leaves of *E. globulus*, and are not unlike some broad forms of *E. viminialis*.

The mature leaves are practically the same in the three species, and they are relatively smaller than those of *E. globulus*, and about the same size as the coarse form of *E. viminialis*.

The buds of *E. Bourlieri* are turbinate, on a very narrow base, while the operculum is conical and rather long, nearly as long as the calyx-tube. They do not appear to differ very much from those of *E. antipolitensis*, but, on the other hand, the fruits are more turbinate and resemble one form of *E. unialata* found in Tasmania. The buds of the type of *E. unialata* are scarcely turbinate; they are, according to the figure, closely sessile with a broad base, and have a very short operculum, shorter than the calyx-tube.

The fruits of *E. Bourlieri* depicted at Plate 212 are immature, and, therefore are unsatisfactory for taxonomic purposes. The fruits of the type are closely sessile, unicostate and very glaucous. The fruits of *E. unialata* are almost the same shape as those of *E. Bourlieri*, but they are thicker and less glaucous, and the valves appear to be stronger and more exsert. The description of the fruits of *E. Bourlieri*, especially as regards the setting of the fruit, which is generally solitary, agrees very well with fruiting specimens of *E. unialata* in the National Herbarium, Sydney.

It seems to me, that owing to the variation in the buds and fruits of *E. Bourlieri* it should be kept apart from *E. unialata* and *E. antipolitensis*. In any case, it is the oldest species of the three, and if at any time the others are found to be conspecific, it has priority over them.

## THE CURVING BOUNDARY

" COULD we but know the actual curving boundaries of a few hundreds of our best defined species what a wealth of new generalisations could be drawn from them, and how much new information they would yield concerning the factors which govern distribution in general ?

" For, irregular as these lines would be, I can but think that they would, in many cases, stand in definite relation to lines of other kinds: to isothermals, to altitudinal contours, to degrees of humidity, to the boundaries of geological formations, the limits of glaciation, the ranges of animals—especially pollen-bearing insects—to the paths of bird-migration, and finally to the course of human traffic." [Dr. B. L. Robinson's Presidential Address to the Botanical Society of America, *Science*, Vol. XIV, No. 352 (1901). Quoted in my Presidential Address to the Linnean Society of New South Wales, Vol. XXVI, p. 763 (1901), 1902.]

I went on to say that " Our results may, for many years, prevent us from affording satisfactory information in regard to a number of these points, but they are ideals, and should be striven after. I show you to-night a 'curving boundary' of one of our important species. The idea of graphical representation of range of species occurred to me many years ago, and I have had it in limited use for two or three years. It may proceed simultaneously with the main botanical map, and is, in fact, supplementary to it."

There was at the time what I may express as a "boom" in the better scientific definition of botanical areas, which has continued to this day, and the most valuable outcome of this has been the inauguration and the building on a firm foundation of the science of ecology.

In the "Report of the Interstate Conference on Forestry," Perth, W.A., 1917, at p. 13, I made a further reference to the subject, as follows:—

1. *A Botanical or Forest Survey*.—First of all let me explain what a curving boundary is by this map [not reproduced]. The use of such a term is an endeavour to replace a vague statement that a tree is found on the Eastern Goldfields, or in the South-west of Western Australia, by a graphic record of where it really occurs. We mark on the map, by a blue cross, or other indication, where a certain kind of tree (a species or variety) has been found, and the more or less curved line, which indicates the outer line (and inner, in certain cases) which joins the intersections of these crosses in the curving boundary.

In other words, at a particular date, it indicates the territory within which the tree is found. It serves as a basis for a more accurate record, for obviously we are always learning. In a work of this kind the forester and the botanist are mutually helpful, for unless the botanist checks the record the forester may be led to give erroneous estimates of the distribution of a particular tree, and we ought, as regards our Australian trees, to do what we can to dispense with vague generalisations as to the areas and constituents of our forests. While we establish the curving boundary, we concurrently obtain a good deal of information as to the distribution of particular trees within that boundary.

To some extent the trees in Western Australia are gregarious, but many are not so, and different species have varying amounts of denseness of distribution. So that the problem is one of some complexity, but it has to be worked out. Every man who has goods to sell has to say what he has got and where the goods are. Thus we must have the botanical survey, or to save the feelings of persons who look upon the botanist as a merely academic person, call it the forest survey. Not one of our Australian States has progressed much in the direction of making such a survey, so that Western Australia, with its vast areas and sparse population need not feel ashamed of itself in this respect.

It must be borne in mind that the very foundation of forestry in any State is this particular forest survey. The term is not sufficiently explicit, as it may mean many things, but the accurate indication of the whereabouts of the trees in any State is a condition precedent to the forester being able to get on with his working plan. You may starve the opportunities of the botanist as much as you like, but in this matter he stands firmly as the rock of Gibraltar when he says "No botanical survey, no proper forest administration."

2. *Each State must work out its Botanical Survey.* Speaking more particularly of my own State, we require a botanical survey of New South Wales. We have an enormous amount of material for such record in the National Herbarium of New South Wales. We require, as regards this State alone, one man charged with the duty of keeping the records of the survey, and he should as far as possible be relieved from all other duties, except those of systematically collecting. We have merely scratched the surface as regards the distribution of our indigenous plants, and I would impose on the botanical surveyor the additional duty of systematically recording the advance (with dates) of weeds, particularly those infesting agricultural and pastoral lands. Up to the present time we have ascertained the range of most of our indigenous and introduced species in a fortuitous manner. We have, however, now arrived at the time when the records of the plant-survey, as of all other statistics, should be recorded in a proper way. Ideally the record of each species (no matter of what State) should be entered on separate maps of Australia. This map (with the principal physical features and townships printed in pale ink) should be a standard one, selected by the Government Botanists of the various States in conference. No matter how sparse the records, the ideal of *one species one map* should be borne in mind, but until the work develops a purely provisional arrangement of temporarily placing two or more records on the same map could be adopted. As facts of distribution accumulate, two or more species of a genus could be placed on one map, the curving boundary of each indicated by a different coloured ink. My own method is to indicate each locality by a cross in pencil or ink, and each cross can be joined by a curving boundary line in ink, joining the extreme eastern localities or the extreme western, southern or northern ones, as the case may be.

Concurrently with this development of the botanical survey in individual States, a Federal botanical survey will be developed. This does not necessarily imply that it will be carried out by a Federal officer, who might not be as well informed of the details of the flora as a State officer. Indeed most important work might be carried out by private botanists. Once particulars of State surveys are published, it will be

open to any botanist to try his hand at a Federal survey. Each man engaged on such a collective task will give his work the impress of his own individuality, and the final co-ordination could fairly be supported by Commonwealth funds.

3. *The E. albens Line.* The curving boundary of this well-known species has been shown to be so important in its relations that it may be especially noted as illustrative. Mr. R. H. Cambage first drew my attention to its importance about 1904, and he subsequently wrote :—

The area described as the Western Slopes (N.S.W.) forms a gradation from the mountains to the plains, and has a less rainfall than either the coastal or mountain division. Its eastern margin practically coincides with that of *E. albens* Miq. (White or Grey Box), and nowhere in New South Wales is any particular zone of temperature better defined by the vegetation over such a distance than along the eastern edge of these White Box trees. This species seems to slightly prefer an igneous to a sedimentary formation, but may be found on both, and is usually looked upon as an indication of good wheat-producing country. Its distribution throughout the length of the State affords an excellent illustration of the gradual change of climate from south to north. In the south it is seldom found above an elevation of 1,500 feet, but in the north it often ascends to upwards of 2,500 feet, and in places reaches to 3,000 feet. (*Journ. Aust. Assoc. Adv. Sci.*, XI. 481, 1907.)

In the following year, in "The Surveyor," xxi, p. 11, he expands the above, and gives details as to the localities and topography of the earlier paper. It is too long to reproduce here, but it should be carefully read. At Part XI, 23 (1910), of the present work, I have drawn attention to Mr. Cambage's observations, which indicate a useful climatic boundary to agriculturists, pastoralists and others.

(Incidentally it may be remarked that the soil on which *E. salmonophloia* occurs has proved the best for wheat-growing in Western Australia, consequently the curving boundary of that species would prove useful in study of the wheat problem).

Except as regards the north of New South Wales (where it is not well defined), I adopted the *albens* line as the western boundary of the Western Slopes in my Vegetation Zones Map of 1906 (*Agri. Gaz. N.S.W.*, June, 1906, p. 632).

It may be described as follows, as far as our present knowledge goes :—

*Western boundary, N.S.W.* Going north from the Murray, we have Corowa, Coreen, north to Binya, east to Temora, north to Barmedman, north-east to Grenfell, then more or less north-west to the Forbes district, thence more or less north-east to Parkes, Peak Hill, Narromine, Gilgandra, Baradine, north to Pilliga, nearly due east to Narrabri, north-east to Bingara and Warialda.

The country between this district and the Queensland border has not been fully mapped out as regards this species. Forest Guard Lance B. Peacocke says that it is plentiful throughout most of the Inverell district, where the basalt and shale formations appear. (The eastern record of the Inverell district cannot be pushed much further to the east, because the cold will be too much for *E. albens* as Glen Innes is approached). He specifically quotes Mt. Topper, State Forest No. 419. Parish of Swinton, County of Hardinge, and the Parishes of Ashford, McIntyre and Bannockburn, County of Gough, and of Ena, Boraand Adowa, County of Arrawatta.

Forest Guard G. J. Hampstead finds it in the vicinity of Macpherson Range (Queensland border), reporting it from between Wallaby Creek and Koreelah Range, County of Buller.

*Eastern boundary.* The most south-easterly locality I have is the Queanbeyan district. Here is a reminder that we are in a comparatively cold district, and that the species must find out sheltered localities in which to flourish. The boundary about here is probably a very irregular line. At all events, we do not know what it is. The species occurs going north from Canberra to Yass, north-easterly to Wombeyan Caves and the Camden district.

3A. *The Sydney Enclave.* Then there is what I may term the "Sydney enclave" with which we are so familiar, since so many southern plants, coming north, avoid the Sydney district (roughly the County of Cumberland). This enclave of low-level country is too warm for many southern species which flourish at an elevation of say 1000 to 2,500 feet, and they get north *via* the Blue Mountains or the broken country to the west of them. In that way such a species as *E. albens* arrives at that measure of climatic equilibrium which it requires.

This "Sydney enclave" indicates the proximity of a plant-bridge, just as a geocol does, but for a very different reason. The "Sydney enclave" indicates that, surrounding it, there is passage of species by means of approximate continuity of high land, while a geocol indicates the reverse, viz., a break or gap in the high land, through which plants can pass and repass. In the former case, the migration of plants is approximately north and south, in the latter case, approximately east and west.

To resume our records of *E. albens*: A few miles north of Wallerawang we go north to Rylstone and Barigan, and north-east to Merriwa and Scone, then more or less northerly to Murrurundi, Currububula, Tamworth to Inverell, and on to the Queensland border.

*In Victoria*, notes on the range are given in Part XI, p. 23. It grows in the Tambo Valley between Fainting Range and Bindi, and in the Snowy River Valley. Dr. A. W. Howitt also observed it in places in the north-eastern district.

The following are the Victorian localities, and, so far as I am aware, are very incomplete:—Heathcote, Bendigo, Eurora, Rushworth, Rutherglen, Ovens River, Tongio, Gippsland, Ensay, Tambo River. See Map 294.

*In South Australia* the species is only known in the Flinders Range, a few miles to the east of Port Augusta. Specific localities are Mount Remarkable, Laura, Wirrabarra.

Until we know more fully the range of the species in Victoria and South Australia, it is obvious that we cannot construct curving boundaries for it for the whole of Australia. We have already seen that we do not fully know them for New South Wales, the State we know most about in this connection.

A few additional boundary curves of species will be shown later, if convenient, and I only wish that the aspiration of Dr. Robinson to see the curves of a "few hundreds of our best defined species" could be realised. It would give a great impetus to botanical science if the curves of say three hundred species of *Eucalyptus* could be given, but that must remain a pious hope for the future. I have a large mass of data on the subject already accumulated in this work, but considerations of time and expense are involved, and they are insuperable at present.

Other branches of the subject of *Eucalyptus* have also had to be laid aside. I especially regret the practical abandonment of the curving boundaries, as I wished to work out some of the interesting generalisations that study of them has in store for the investigator.

4. The relation between wheat-growing and rainfall, particularly as regards—  
*a.* New South Wales (compared with the *E. albens* line.)

The Commonwealth Meteorological publication of Hunt, Taylor and Quayle (1913), has already been cited, as regards its importance to rainfall problems.

We also turn to "The Australian Environment" (*especially as Controlled by Rainfall*) [my italics], by Griffith Taylor, being Memoir No. 1 of the Advisory Council of Science and Industry (1918). This important memoir largely deals with rainfall, as its title indicates.

The phenomenon which most strikingly, and universally perhaps, exhibits climatic control is the earth's covering of vegetation.

This is a quotation from Bonacina, by Griffith Taylor, who puts the position as follows:—

The natural vegetation is the chief response of nature to rainfall, and is very closely bound up with the season and abundance of the rain.

See also "Distribution of the *Eucalyptus*" by Howitt in *Trans. Roy. Soc., Vict.*, ii, 104. This portion of the paper has been already referred to under "Altitude" (Part LXVII, p. 338), with which of course it is inseparably bound up.

"Physical Geography and Climate of New South Wales," 2nd Edition (1892), by H. C. Russell, F.R.S., is one of the most valuable of the earlier pamphlets.

In *Agric. Gaz., N.S.W.*, for January, 1905, Mr. T. A. Coghlan, Government Statistician, published a "Memorandum regarding Area of New South Wales Suitable for Wheat-growing," which was illustrated by a "Diagram map of N.S.W. showing the area in which Agriculture can be carried on under favourable conditions of rainfall." It contains a *solid* "Crop-line (based on actual results)" and a *dotted* "Theoretic (Rain) line." The former line is defined in detail, and represents the westward limit of profitable wheat-growing based upon actual results (see pp. 1—3). The "rain" line is referred to at p. 4. Compare 1912 (Trivett).

In "Wheat-growing in Relation to Rainfall," John B. Trivett, *Agric. Gaz., N.S.W.*, xxiii, 737 (September, 1912), has a map of New South Wales, bearing three lines in black, red and blue, as follows:—

*Black*, limit of 10 inch rainfall (Hunt's line) from April to October, inclusive (the growing period for wheat).

*Red*. Wheat experience line (Coghlan's *solid* line, 1904).

*Blue*. Wheat experience line, 1912.



During the eight years, the western boundary of profitable wheat-growing (see Coghlan's solid line, 1904 map) has moved further westward, and it is pointed out that the line will never wholly coincide with the 10 inch isohyet, since success depends not so much on the total rainfall as on the incidence of it. (Compare 1905, Coghlan.)

(Reference may also be made to "The Climatic Control of Australian Production" by Griffith Taylor, Bulletin No. 11, Commonwealth Bureau of Meteorology, 1920, p. 20).

The article "Wheat-breeding in Australia" by A. E. V. Richardson, in *Journ. Agric. Vict.*, Nov., 1914, p. 644, has a clear map of Australia, showing isohyets, obtained from the Commonwealth Meteorologist. The map shows—

1. The high rainfall belt (20 inches and over), coloured green in Mr. Richardson's map.
2. The intermediate belt (over 10 inches and under 20 inches), coloured yellow.
3. The low rainfall belt (under 10 inches) coloured grey.

In South Australia, the margin of cultivation of wheat has already been extended to the 10 inch isohyet, and profitable wheat-growing is now carried on in districts with an annual rainfall of under 10 inches.

The latest publication on the subject is by Mr. H. A. Smith, entitled "Wheat-growing in New South Wales" (Memorandum by the Government Statistician regarding the area of the State within which experience has shown that wheat for grain can be grown profitably). Laid before the Legislative Assembly, September, 1923.

He shows a map with lines drawn across it representing:—

- (a) The eastern limit of wheat-growing in 1922, in blue.
- (b) The western limit of wheat-growing in 1922, in blue.
- (c) The western limit of wheat-growing in 1912, in green.
- (d) The western limit of wheat-growing in 1904, in brown.
- (e) The western limit of 10-inch rainfall in the growing season—average from April to October, inclusive, in scarlet.

Mr. Smith then details "The Western Wheat Line of 1922," and says it "along its entire length passes through the edge of the great Western Plains, where the natural features of the country are uniform. Its trend is decided principally by rainfall and the nature of the soils." He then proceeds to describe the line geographically, and goes south to north. Starting from the Queensland border, near Yetman, it successively goes near Pilliga, Pallamallawa, Wee Waa, Coonamble, Gulargambone, Collie, Warren, Nevertire, Fifield, Condobolin, Cargellico, Rankin's Springs, Hillston, Murrumbidgee Irrigation Areas, Darlington Point, Moulamein, Balranald, Barham (most westerly point).

"The Eastern Wheat Line of 1922" is similarly treated. It "is determined partly by the contour of the country and partly by the rainfall. Very little wheat is grown at an altitude of more than 2,000 feet."

He quotes the line as :—Queensland border north of Ashford, then Glen Innes, Inverell, Barraba, Tamworth, Moonbi, Nundle, Murrurundi, Muswellbrook, Denman, Wollar, Rylstone, Mudgee, Sofala, Bathurst, Cowra, Crookwell, Goulburn, Queanbeyan, Yass, Tumut, Holbrook, Bowna (near Albury).

We have not yet absolutely settled the eastern and western wheat lines in New South Wales, nor the eastern and western *Eucalyptus albens* lines; it will probably take many years to do this. It is a coincidence that the above pairs of lines show so much parallelism, and hence there becomes added interest in our investigation of the range of *E. albens*. Other students will follow the ranges of this species and of wheat in other States, and thus we have an incentive to study the curving boundaries of other species.

6. *Goyder's Line of South Australia*. I have already invited attention to the value of the curving boundary of *E. albens* as an agricultural or wheat line in New South Wales, and I proceed to give an account of Goyder's Line, a rainfall line, north of which farmers would attempt to grow wheat at their peril. South Australian botanists should study it in connection with the range of *E. albens*.

South Australia experienced an unusually severe drought in 1865. On November 3rd of that year, the Commissioner of Crown lands instructed the Surveyor-General (Mr. G. W. Goyder) to proceed to the north of the State, with as little delay as possible, and by his own personal observations obtain such information to enable him to lay down on a map a line of demarcation between that portion of the country where the rainfall has extended and that where the droughts prevail.

In Mr. Goyder's report to the Government on this matter (December 6th, 1865) (see Proceedings of Parliament, 1865–6, Nos. 62, 78, 82, 133, 154), he says :—

Had the drought, which unfortunately still prevails, been that of an ordinary nature, there had been no necessity for my leaving town upon this duty, as the line of demarcation might have been shown from information previously in my possession . . . . The drought, however, being of an unusually severe nature, and extending more generally than any previously known, it became indispensable to add to my previous experience the knowledge of the state of the country as it now exists . . . .

The result of my investigation shows the line of demarcation extending considerably further south than I anticipated. The change from the country suffering from excessive drought to that where its effect has only been slightly experienced being palpable to the eye from the nature of the country itself, and may be described as bare ground, destitute of grass and herbage; the surface soil dried by the intense heat, in places broken and pulverised by the passage of stock, and formed by the action of the wind into miniature hummocks, surrounding the closely cropped stumps of salt, blue and other dwarf bushes, whilst those of greater elevation are denuded of their leaves and smaller branches as far as the stock can reach. This description generally holds good of all country upon which stock has been depastured and where the drought obtains. The change from that to where the drought has had a less serious effect being shown by the fresher and more leafy appearance of the bushes, gradually improving to those in their ordinary state, and the gradual increase of other vegetation from bare ground to well grassed country.

During my visit I observed that places upon stocked runs pretty well grassed during the drought of 1859 are now utterly destitute of grass or herbage.

The line of demarcation I found to extend from Swan Reach on the River Murray, in a north-westerly direction, to the Burra Hill; and thence north to Oak Rises, east of Uooloo, and by the last-named hill to Mount Sly; and in a northerly and westerly direction as shown by plan herewith forwarded, by the Hogshead

and Tarcowie to Mt. Remarkable; thence southerly by the Bluff and Ferguson's Range to the Broughton; and south-westerly to the east shore of Spencer's Gulf, crossing the Gulf to Franklin Harbour; and thence north-westerly to the west end of the Gawler Ranges . . . . "

The line as shown in plate is practically identically the same as the one put on the map by Mr. Goyder in 1865.

The generally accepted idea in South Australia (says Mr. W. J. Spafford, who kindly supplied the above information) of how Mr. Goyder decided on this line of demarcation between farming lands and purely pastoral lands was that he followed the line of saltbush, but from his own stating of the position, it was rather the defining of the line above which the 1865 drought was very severe. As it happens, Goyder's Line does follow the edge of our saltbush country, and remarkably close to it all the way. Mr. Spafford goes to on say :—

"Goyder's Line" may be described somewhat as follows, regarding present-day towns :—

Commencing at the point of junction between 141° long. and 35° lat., the "line" travels a little north of west, past the Kringin Railway Siding, crossing the Paringa railway line about midway between Wanbi and Mindarie, then crosses the Waikerie railway line at Galga, and the River Murray at Swan Reach. From here it takes a more northerly course, crossing the Morgan railway line at Sutherlands, to a point about 4 miles east of Robertstown, and then travels almost due north, passing about 7 miles east of Burra, to a point about 9 miles east of Hallett. Now taking a north-westerly course it passes through Terowie to Morchard, keeping about 4 miles to the west of Peterborough. At Morchard it turns abruptly and for about 16 miles travels a little west of south, then turns sharply to the north-west for about 16 miles to a point just south of Melrose on the Wilmington railway line. The "line" then travels almost directly south to Crystal Brook and takes a south-west curve to Moonta Bay, passing just north of the town of Moonta.

Commencing again on Eyre's Peninsula at Point Gibbon, it takes a north-westerly direction, crossing the Kimba railway line at a point about midway between Rudall and Kielpa, then the Cape Thevenard railway line at Kyancutta, and again between Wudinna, and Yaninee, and continues on the north of, and almost parallel to, this railway line to a point about 7 miles above Mudamuckla Railway Siding.

## EXPLANATION OF PLATES 292-295.

### PLATE 292.

Griffith Taylor's Key Map to his 15 Rainfall Regions (Climographs), 1918. [See text, this work, Part LXVI, p. 239.]

### PLATE 293.

Map of New South Wales showing :—

1. The curving boundary of *Eucalyptus albens*;
2. The wheat limits, 1904-1922; and
3. The 10-inch rainfall line, April to October (after H. A. Smith).

### PLATE 294.

Map of Victoria showing the localities of *Eucalyptus albens*.

### PLATE 295.

Map of South Australia, after Map p. 498, Gregory's "Australasia," Vol. I, showing the localities of *Eucalyptus albens*, viz., Laura, Wirrabara and Mount Remarkable. Also Goyder's Line of Rainfall.

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales" \* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets :—

- |   |  |
|---|--|
| <i>acacioides</i> A. Cunn. (xlviii).                        | <i>melliodora</i> A. Cunn. (ix).                 |
| <i>acmenioides</i> Schauer (xxxii).                         | <i>microcorys</i> F.v.M. (xxxviii).              |
| <i>affinis</i> Deane and Maiden (lvi).                      | <i>microtheca</i> F.v.M. (lii).                  |
| <i>amygdalina</i> Labill. (xvi).                            | <i>Muelleriana</i> Howitt (xxx).                 |
| <i>Andrewsi</i> Maiden (xxi).                               | <i>numerosa</i> Maiden (xvii).                   |
| <i>Baileyana</i> F.v.M. (xxxv).                             | <i>obliqua</i> L'Hérit. (xxii).                  |
| <i>Bakeri</i> Maiden (lxx).                                 | <i>ochrophloia</i> F.v.M. (l).                   |
| <i>Baueriana</i> Schauer (lvii).                            | <i>odorata</i> Behr and Schlectendal (xli).      |
| <i>Baueriana</i> Schauer var. <i>conica</i> Maiden (lviii). | <i>oleosa</i> F.v.M. (lx).                       |
| <i>Behriana</i> F.v.M. (xli).                               | <i>paniculata</i> Sm. (viii).                    |
| <i>bicolor</i> A. Cunn. (xliv).                             | <i>pilularis</i> Sm. (xxxi).                     |
| <i>Boormani</i> Deane and Maiden (xlv).                     | <i>piperita</i> Sm. (xxxiii).                    |
| <i>Bosistoana</i> F.v.M. (xliii).                           | <i>Planchoniana</i> F.v.M. (xxiv).               |
| <i>Caley</i> Maiden (lv).                                   | <i>polyanthemos</i> Schauer (lix).               |
| <i>capitellata</i> Sm. (xxviii).                            | <i>populifolia</i> Hook. (xlvii).                |
| <i>conica</i> Deane and Maiden (lviii).                     | <i>propinqua</i> Deane and Maiden (lxi).         |
| <i>Consideniana</i> Maiden (xxxvi).                         | <i>punctata</i> DC. (x).                         |
| <i>coriacea</i> A. Cunn. (xv).                              | <i>radiata</i> Sieb. as <i>amygdalina</i> (xvi). |
| <i>corymbosa</i> Sm. (xii).                                 | <i>regnans</i> F.v.M. (xviii).                   |
| <i>crebra</i> F.v.M. (liii).                                | <i>resinifera</i> Sm. (iii).                     |
| <i>Dalrympleana</i> Maiden (lxiv).                          | <i>robusta</i> Sm. (lxviii).                     |
| <i>dives</i> Schauer (xix).                                 | <i>rostrata</i> Schlecht. (lxii).                |
| <i>dumosa</i> A. Cunn. (lxv).                               | <i>rubida</i> Deane and Maiden (xliii).          |
| <i>eugenioides</i> Sieber (xxix).                           | <i>saligna</i> Sm. (iv).                         |
| <i>fruticetorum</i> F.v.M. (xlii).                          | <i>siderophloia</i> Benth. (xxxix).              |
| <i>gigantea</i> Hook. f. (li).                              | <i>sideroxylon</i> A. Cunn. (xiii).              |
| <i>globulus</i> Labill. (lxvii).                            | <i>Sieberiana</i> F.v.M. (xxxiv).                |
| <i>goniocalyx</i> F.v.M. (vi).                              | <i>Smithii</i> R. T. Baker (lxx).                |
| <i>hæmastoma</i> Sm. (xxxvii).                              | <i>stellulata</i> Sieb. (xiv).                   |
| <i>hemiphloia</i> F.v.M. (vi).                              | <i>tereticornis</i> Sm. (xi).                    |
| <i>longifolia</i> Link and Otto (ii).                       | <i>tessellaris</i> F.v.M. (lxvi).                |
| <i>Luehmanniana</i> F.v.M. (xxvi).                          | <i>Thozetiana</i> F.v.M. (xlix).                 |
| <i>macrorrhyncha</i> F.v.M. (xxvii).                        | <i>viminalis</i> Labill. (lxiv).                 |
| <i>maculata</i> Hook. (vii).                                | <i>virgata</i> Sieb. (xxv).                      |
| <i>Maideni</i> F.v.M. (lxix).                               | <i>vitrea</i> R. T. Baker (xxiii).               |
| <i>melanophloia</i> F.v.M. (liv).                           |  |

\* Government Printer, Sydney. 4to. Each part contains 4 plates and other illustrations.

NOTE BY GOVERNMENT PRINTER.

Financial conditions have so largely affected publications that it is no longer possible to continue the issue of "The Forest Flora of New South Wales" at the old rates, and from this date onward, *i.e.*, from and including Part 7, Vol. VII, the price of the individual Parts will be raised to 2s. 6d. each.

For those Parts already published the old sale price will be adhered to, and subscriptions already received will not be disturbed, but the new subscription rate of 2s. 6d. per part, or 25s. for 12 parts, will come into effect as from the 1st July, 1921.

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- 207. *E. patellaris* F.v.M.
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2. Variety of species?
3. Inequality of species-values.
4. No fixed line of demarcation between species.
5. Jordan's species.
6. A classical case of "splitting."
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3. Model descriptions.
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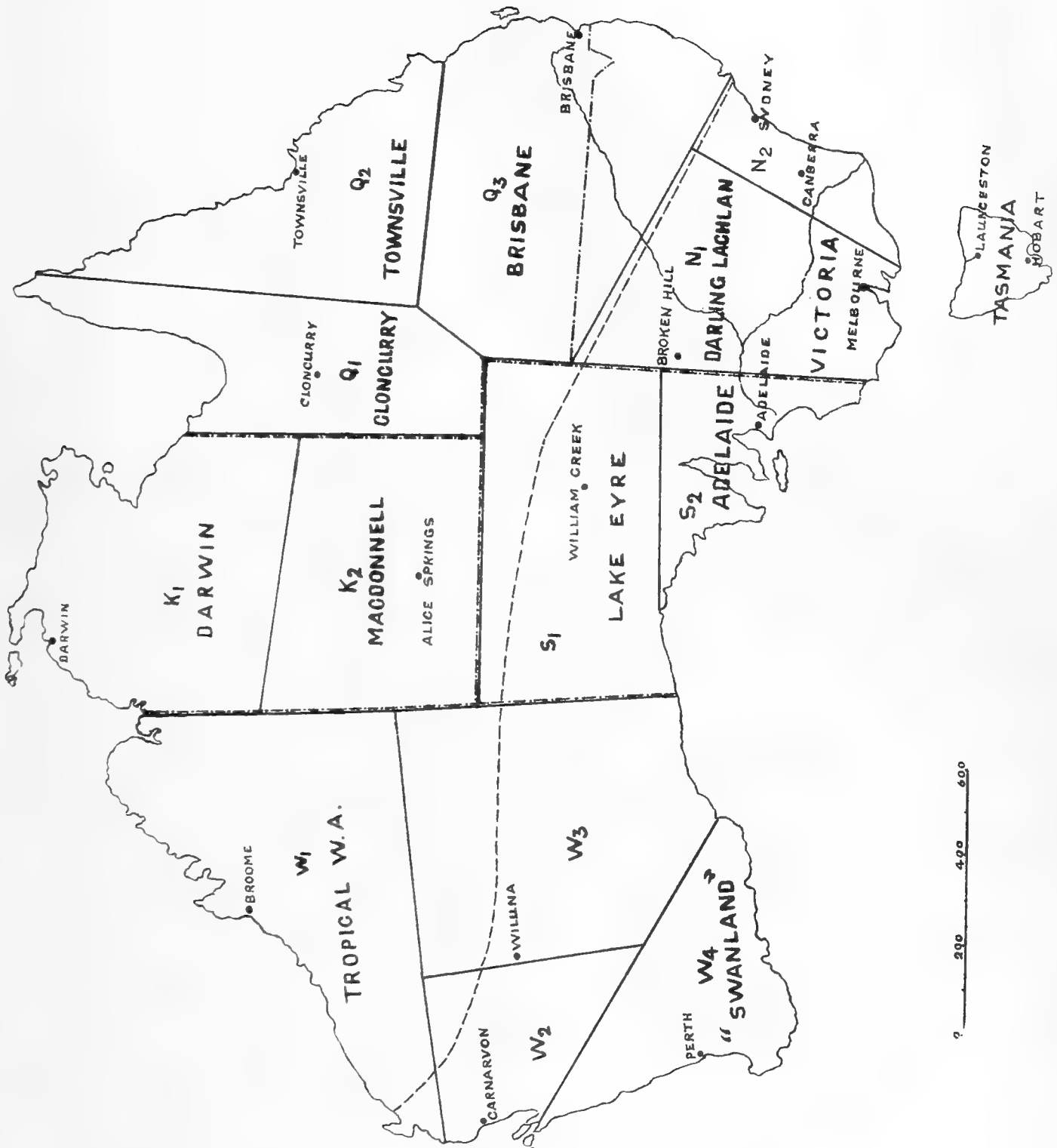
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- 392. x *E. McClatchie* Kinney.
- 393. x *E. Mortoniana* Kinney.
- 394. *E. Dixsoni* Wakefield, n.sp.
- 98. *E. globulus* Labill.

Var. *compacta*, n. var.

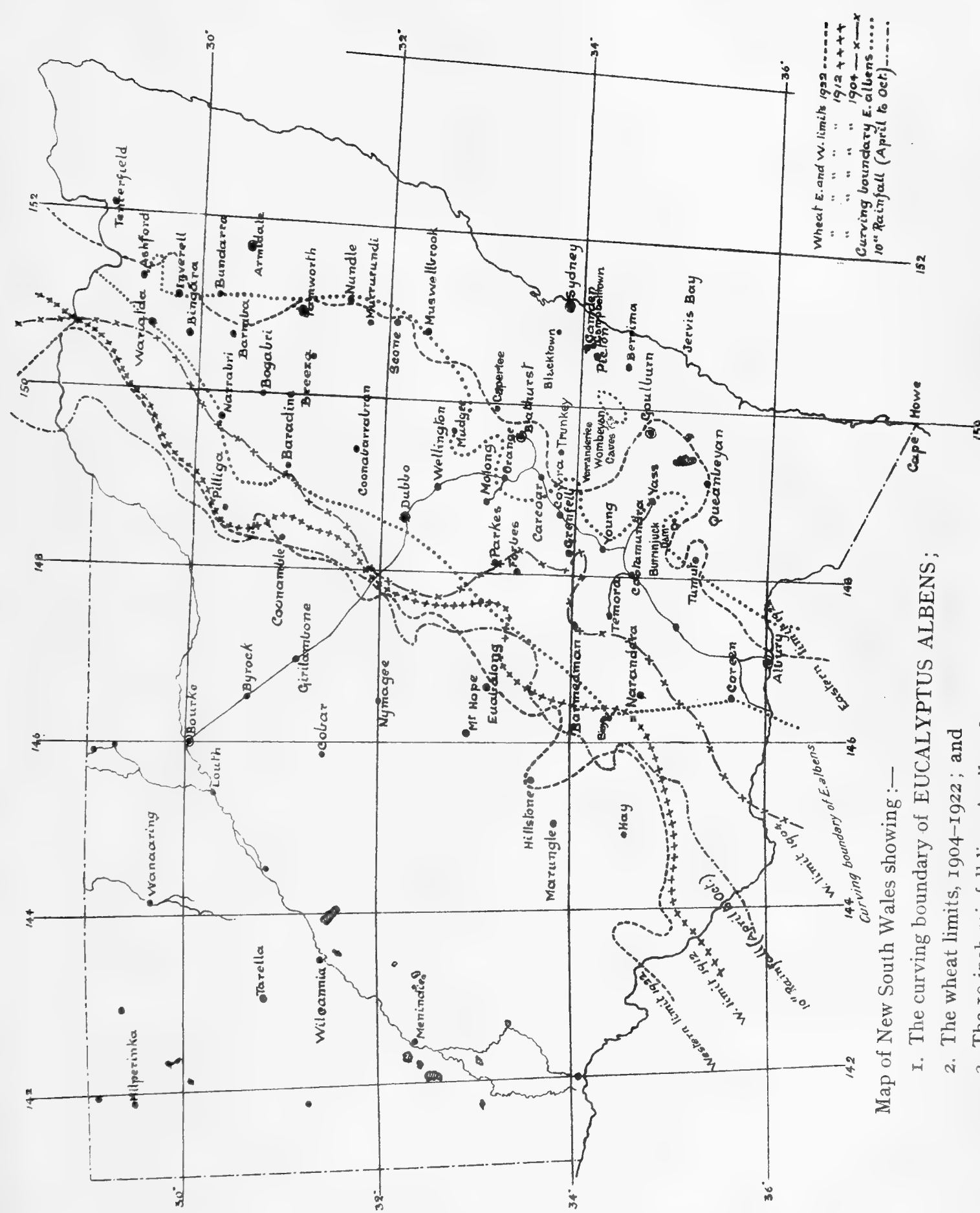
- 395. *E. biscotata* Maiden, Blakely and Simmonds, n.sp.
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- 414. *E. Subcrenulata* Maiden and Blakely, n.sp.
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Griffith Taylor's Key Map to his 15 Rainfall Regions (Climographs), 1918. See text, this work, Part LXXVI, p. 239.



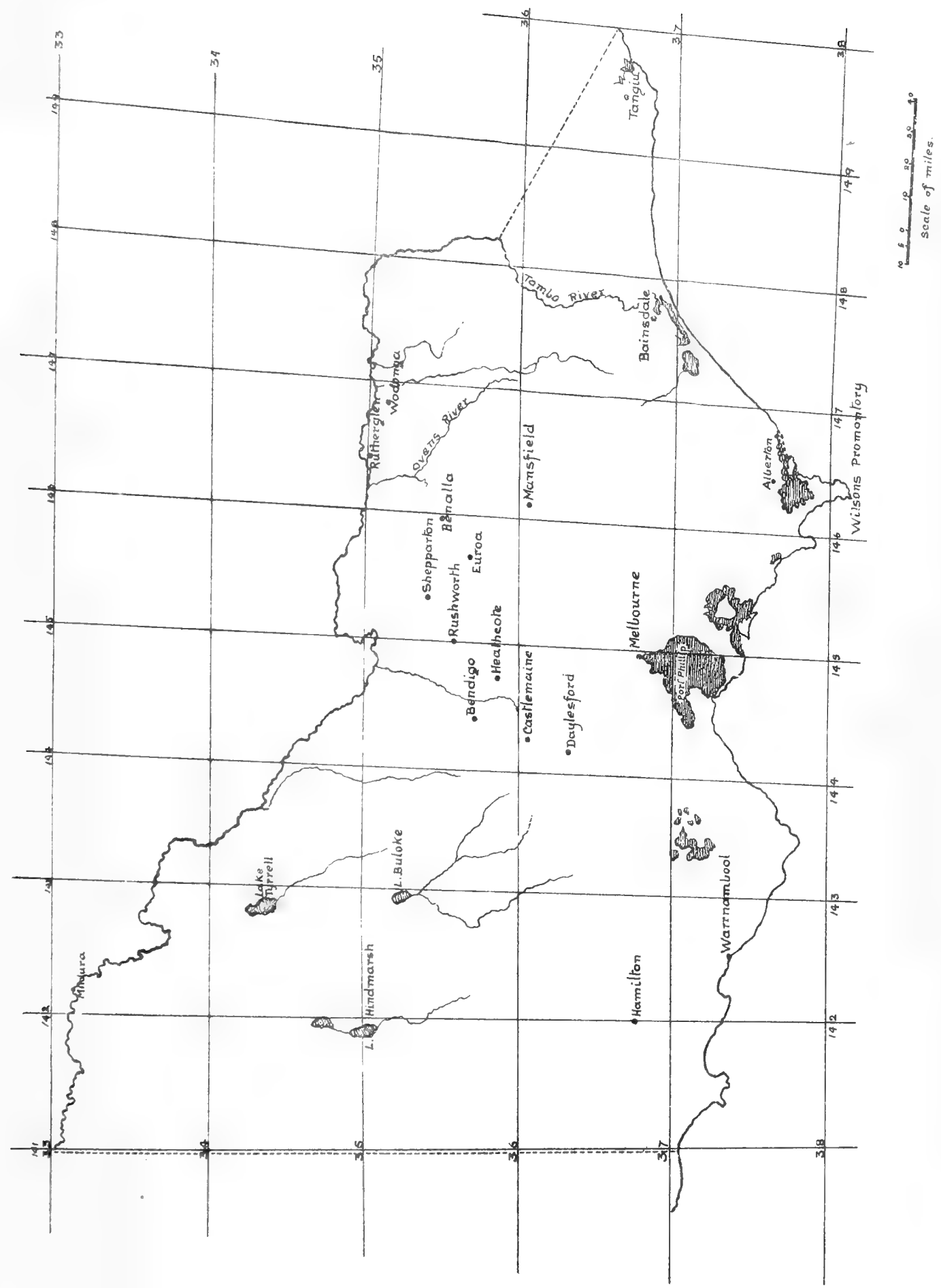


Map of New South Wales showing:—

1. The curving boundary of EUCALYPTUS ALBENS;
2. The wheat limits, 1904-1922; and
3. The 10-inch rainfall line, April to October (After H. A. Smith).

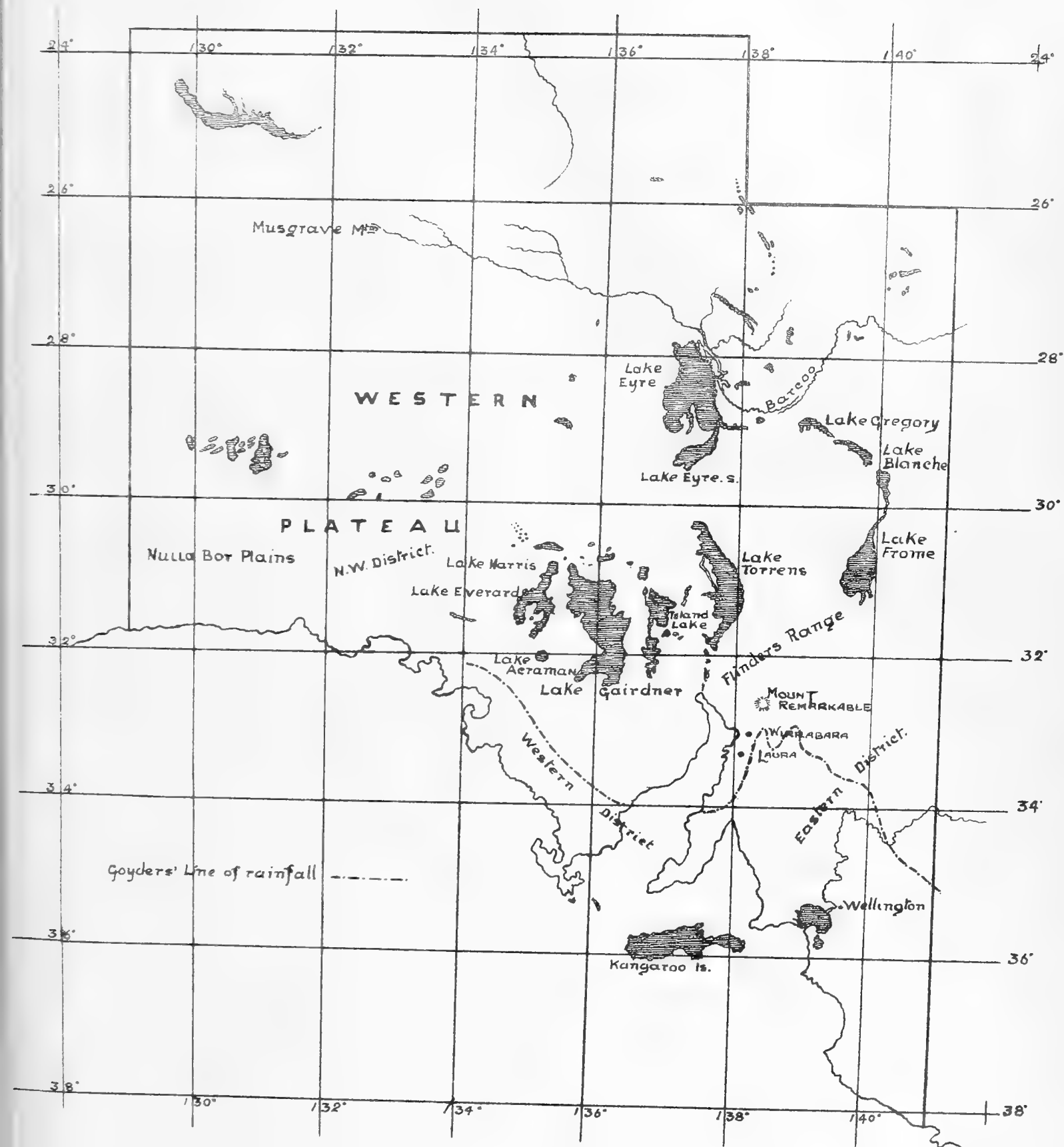






Map of Victoria showing the localities of EUCALYPTUS ALBENS.





Map of South Australia, after Map p. 498, Gregory's "Australasia," Vol. I, showing the localities of *EUCALYPTUS ALBENS*, viz., Laura, Wirrabara, and Mount Remarkable. Also Goyder's Line of Rainfall.



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 209. *E. intermedia* R. T. Baker.  
 210. *E. patellaris* F.v.M.  
 211. *E. celastroides* Turczaninow.  
 212. *E. gracilis* F.v.M.  
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 214. *E. longicornis* F.v.M.  
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 217. *E. virgata* Sieber.  
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 254. *E. tetradonta* F.v.M.  
 255. *E. odontocarpa* F.v.M.  
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 258. *E. Blaxlandi* Maiden and Cambage.  
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 260. *E. eilemoydes* F.v.M.  
 261. *E. Ebbanoensis* Maiden n.sp.  
 262. *E. Andrewsii* Maiden.  
 263. *E. angustifolia* R. T. Baker.  
 264. *E. Kybeanensis* Maiden and Cambage.  
 265. (dup. of 252) *E. eremophila* Maiden.  
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 267. *E. Mitchelliana* Cambage.  
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 275. *E. Cullenii* R. H. Cambage.  
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 284. *E. pumila* Cambage.  
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 2. Eucalyptus bark classifications.  
 O. Mallees, Marlocks, and other small species—  
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 288. *E. striatocalyx* W. V. Fitzgerald.  
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 290. *E. Stricklandi* Maiden.  
 291. *E. unialata* Baker and Smith.  
 31. *E. Planchoniana* F.v.M.  
 21. *E. marginata* Sm.  
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 295. x *E. Cordieri* Trabut.  
 296. x *E. gomphocornuta* Trabut.  
 297. x *E. jugalis* Naudin.  
*E. occidentalis* Endl., var. *oranensis* Tra but.  
 298. x *E. pseudo-globulus* (Hort.) Naudin.  
 299. x *E. Trabuti* Vilmorin.  
*E. Stuartiana* x *globulus* Trabut.  
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# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

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(Lately Government Botanist of New South Wales and Director of the  
Botanic Gardens, Sydney).

VOL. VIII. PART 3.



PART LXXIII OF THE  
COMPLETE WORK.  
(WITH FOUR PLATES.)

PRICE THREE SHILLINGS AND SIXPENCE.

*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney:  
ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER.

1929.



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Plates 156-159. (Issued July, 1919.)

# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

Lately Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

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The author of this standard work, Mr. J. H. Maiden, I.S.O., F.R.S., F.L.S., died on 16th November, 1925, at the age of 66 years.

It is most regrettable that he did not live to see the completion of his great work, of which 65 Parts have already appeared, and the final Parts were prepared by him for publication prior to his death.

With the kind permission of Dr. Darnell-Smith, Director, Botanic Gardens, Sydney, this and the subsequent Parts will be edited by Messrs. R. H. Cabbage, C.B.E., F.L.S., and W. F. Blakely, Assistant Botanist, Botanic Gardens, both of whom have been in constant touch with the late Mr. Maiden during the progress of the work.

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## VOL. VIII. PART 3. Part LXXIII of the Complete Work.

(WITH FOUR PLATES.)

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*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

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PRICE THREE SHILLINGS AND SIXPENCE.

*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney:

ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER, PHILLIP-STREET.



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# 1. HISTORICAL.

1869–71. Mueller appears to have been the first to describe *Eucalyptus* seedlings. In his *Fragmenta*, vii, 42, he describes those of thirty-five species on the following plan :—

“*Eucalyptus amygdalina*. Caulix scabridus, teretiusculus, folia opposita, demum sparsa, lanceolato-linearia, sessilia, mox apice acutata, basi cordata.” He does not mention the cotyledons in so many words, though in some cases it is evident that he includes a description of them.

His cautious opening and closing statements are to the following effect :—

(a) *Eucalyptus* plants raised from the seed in the first year of life often show particular diversities not only in species but in varieties.

(b) These brief notes concerning plants raised from seeds in a garden which are easily confused, and in nature difficultly matched with the maternal branch, need confirmation.

1891. Howitt. (*Trans. Roy. Soc. Vict.*, ii, 92) says (of Gippsland eucalypts) (p. 92): “Having now referred to the various types of the Stringybark groups, it is convenient to mention the distinctions between their seedlings and saplings.” (I will only take extracts concerning seedlings at present, as his remarks *re* what he calls “saplings” I will refer to under Intermediate Leaves.)

p. 92. “The seedlings of *E. piperita*, *E. eugenoides*, and *E. capitellata* are beset on stems and leaf-stalks with numerous tufts of hairs, which also line the edges of the leaves. The leaves themselves are more or less hairy, except in that form of *E. capitellata* growing in the mountains, as at Osler’s Creek, where they are smooth (I have Howitt’s original specimens, and have referred them to *E. Baxteri*).

The seedling leaves of *E. piperita*, *E. eugenoides*, and *E. capitellata* are at first ovate and opposed, but in the former I have often observed them to be ovate-pointed, or even lanceolar and smaller than those of *E. capitellata*, which are always ovate. In none of the species are the leaves shiny.”

“In *E. macrorrhyncha* the seedlings are also more or less beset with tufts of hairs (p. 93), giving the stem a rough appearance, but in a less degree than the lastnamed species. The leaves, at first opposed, are lanceolar in form and slightly shiny.”

“The seedlings of *E. Muellieriana* are as characteristic as those of any other species known to me. The stem and stalklets are slightly tufted with hairs, or are even smooth, the leaves rather long, lanceolar, pointed and opposed throughout, even in seedlings of a foot or more in height, while their extremely shiny upper surface distinguishes this form from all other species of this group, being more marked even than in *E. obliqua*, from which the persistent opposition of the leaves readily distinguishes it.”

p. 93. “The seedlings of *E. obliqua* are usually free from hairs, but are very commonly warty, and the leaves are lanceolar, shining on one side, and thinner in texture than those of *E. macrorrhyncha*. They become scattered somewhat sooner than those of *E. macrorrhyncha*, and very much sooner than those of *E. Muellieriana*, and soon show the marked unequalsidedness which is so characteristic of this tree.”

1898. J. G. Luehmann. One of the few references concerning *Eucalyptus* seedlings is—

“There is one feature which will, probably, throw more light upon the limits of species as well as their affinities, with which we are not yet sufficiently acquainted; this is the character of the seedlings. I venture to express a hope that in the near future one of our botanic gardens will undertake the investigation of the subject, which requires not only great knowledge and care, but also certain means that are only at the command of few people.” (*Rep. Aust. Assoc. Adv. Science*, vii, 524.)

1902. In A. J. McClatchie's work (U.S. Department of Agriculture; Bureau of Forestry, Bulletin No. 35) we have the most extensive series of photographs of seedlings of species of *Eucalyptus* known to me. There are thirty-two species on eight plates, but only the names are given, together with a few notes at p. 84. One species is shown in each picture, and they are fair-sized plants.

1914. Cuthbert Hall, M.D. “The Evolution of the Eucalypts in relation to the Cotyledons and Seedlings,” *Proc. Linn. Soc., N.S.W.*, xxxix, 473, with numerous plates consisting of several small seedlings (one for each species) to a plate (1914). The most important research on the subject at the date of publication. He refers to the work of Lubbock in this connection, and also to that of Mueller, which he rightly criticises, I think, the errors of nomenclature being probably caused by Mueller's dependence on outside nurserymen, and because of the state of *Eucalyptus* nomenclature at the time. Dr. Hall's tropical seedlings are sometimes doubtful; I received the seeds before he did, and I know their history. Some of the figures in the plates are extremely difficult to see and to compare, since they are at all angles, and some are even reversed. The quaint Bakerian nomenclature is adopted without synonyms.

Maiden, J. H. My own work on the seedlings has been continuously in progress since 1899, and could not have been carried out without the co-operation of Miss Margaret Flockton, the artist of the Botanic Gardens, Sydney. I am very much indebted to the late and present Superintendents of the Botanic Gardens, Messrs. George Harwood and E. N. Ward, and Messrs. Sydney Smith and Ralph Tate, Propagators. Selections from Miss Flockton's beautiful coloured drawings, representing the seedlings in all stages, have been from time to time shown before Sydney Scientific Societies since 1904, but I have abstained from publishing them, for the same reason which has caused me to abstain from publishing my notes on other phases of the *Eucalyptus* question—from a desire to generalise from material from as large a number of species as possible. Of most species large numbers of individuals were raised, and from as many localities as possible. Anyone who has had horticultural experience knows that while in a pan of seedlings no two seedlings are precisely alike, and extreme forms may show a good deal of variation, it is for that reason risky to make deductions except on a large number of individuals. This applies to hypocotyl, cotyledons, and leaves of all kinds—they all vary. Seedlings from the same capsule vary.

Here is the form adopted throughout the whole of the research. The spaces have been reduced in the copy:—

BOTANIC GARDENS, SYDNEY.

EUCALYPTUS SEEDLINGS.

Species \_\_\_\_\_  
 Locality \_\_\_\_\_  
 Number of Schedule \_\_\_\_\_  
 Date of Sowing \_\_\_\_\_  
 Date of Examination of Seedling \_\_\_\_\_  
 Hypocotyl \_\_\_\_\_  
 Cotyledons \_\_\_\_\_  
 Stem \_\_\_\_\_  
 First Leaves \_\_\_\_\_  
 First Alternate Leaves \_\_\_\_\_  
 Further Remarks \_\_\_\_\_

The botanist of the future will ascertain to what extent there are differences in seedlings as the result of extraneous circumstances, and will experiment on—

1. Seed of varying ages.
2. Seed from a vigorous or a debilitated tree.
3. Seedlings subjected to varying treatment, *e.g.*, richer or poorer, well or inferior-drained soil; crowded and drawn up to the light, whether grown in the open under severer conditions.

One photograph of a seedling cannot show all the stages. In the beautiful water-colour drawings to which I have made reference, several drawings of each have usually been made, as a compromise. The botanists of the future, with adequate endowments, will make very many more, and will even call in the aid of the cinematograph. Unless there was a strong reason to the contrary, I have not raised a seedling unless I had the corresponding botanical material to compare with that of the progeny.

It is just as necessary to know the absolute origin of the seed from which a seedling is raised as it is for the engineer or surveyor to know his base-line. I do not say that all seeds of imperfectly ascertained origin are valueless, but they have the defect that we have imperfect data concerning them, and therefore cannot answer questions as to origin. And in an inquiry on phytogenetic lines, the correctness of our data is especially important.



## 2. THEIR HORTICULTURAL VALUE.

The value of Eucalypts for purely horticultural purposes has not yet been fully ascertained. In the countries of Northern Europe, the glaucousness and comparative hardiness of *E. globulus* and *E. Maidenii* are freely taken advantage of in shrubberies, and in temporary ornamental plantings in the open air during the warmer months, since they make very striking objects when young. Afterwards they become straggly, and also suffer from the effects of winters. Such species as *E. Planchoniana* and *E. eximia*, which require a warmer climate (say Mediterranean conditions) have a totally different appearance, and, when young, say up to 15 feet high, furnish charming substitutes for such plants as the Copper Beech and *Prunus Pissardi*. They are not so compact as these small trees, and their young coloured leaves are succeeded by green ones. The young trees are quaintly straggly, and with sparse, pendulous, long, dull-green foliage, giving them an artistic appearance.

I would suggest that more attention be given to the horticultural side of Eucalyptus. Nurserymen will find that the industry will, however, never get a firm hold until there is a wider knowledge of seedlings. To order a certain species, and to be supplied with an unmeritorious substitute (as I have often known to be the case) may cause a would-be student of the genus to lose interest in these distinctly Australian plants.

## 3. VALUE OF A KNOWLEDGE OF SEEDLINGS TO THE FORESTER, NURSERYMAN, AND GARDENER.

It may be truly said that the appearance of the Eucalyptus seedling is almost unknown to the nurseryman, whether he grows plants for the forester, or for the gardener responsible for private or public gardens and parks, or for street-planting.

Apart from the inherent difficulty of the subject (and my researches are but an attempt to stimulate inquiry), the forester knows, or should know, that the recognition of seedlings in a forest is attended with great difficulty, and requires exercise of all the caution with which he has been endowed. In a pure forest, correct determination may be simple, but the tyro knows that because a seedling has germinated at the foot of a tree, that that tree may not necessarily be its parent. We know that seeds may be scattered by the wind, transported by rain-waters, or in the manure of herbivora.

Until we know the similarities, or dissimilarities, of seedlings, we shall continue to stumble into the pitfalls which abound. I speak feelingly, as I have had hundreds of times to destroy material brought to me in perfectly good faith, and on which I thought I could rely. I know something of the difficulties of foresters in California and Florida, Brazil, Italy, Algiers, India, and other countries, in getting correctly named seed. The fact that recognition of seedlings is so wrapped up with matters of pounds, shillings, and pence, is a reason why I should very much like to have reproduced all the excellent drawings of seedlings which have been made under my direction, and not an imperfect selection of them.

#### 4. DRAWINGS AND THEIR SCHEDULES.

Below I attach copies of the two printed forms which were filled in in regard to all seedlings at the times the coloured drawings were made. The greatest care has been taken to secure the botanical correctness of the seeds, without which the experiments would, in most cases, be useless.

The three-coloured process drawings (for which I am indebted to the kindness of the Hon. Captain Frank Chaffey, Minister for Agriculture) only make one long for more. But they are costly, and so I have had to omit the vast majority of the large seedlings, either because of their size as plants, or because they have individually large leaves. I hope that the public finances will soon permit the reproduction of these omitted drawings, in the interests of science. Not only have most of the larger drawings been omitted, but as regards these and many others, there have been omissions which destroy the continuity of the life-history of individual species. Room could not be found for a single drawing whatever of some species. The trouble arises, of course, because of the magnitude of the genus, and I have endeavoured to make the best selection with the limited space available.

The vast majority of the coloured drawings were made by Miss Margaret Flockton, the artist to whom this work owes so much. Owing to pressure of work in other directions, and large influx of seedlings, she received assistance from Miss Phyllis Clarke during March, 1918, and at other times, and from Miss Ethel King from March, 1919, to August, 1923, and the work of both these artists deserves the highest credit.

Following is the printed matter of the two forms, each of which is of foolscap size :—

BOTANIC GARDENS, SYDNEY.

REGISTER OF SEED SOWN.

Reference Number .....  
 Botanical Name .....  
 Natural Order .....  
 Vernacular Name .....  
 When collected .....  
 Where collected .....  
 By whom .....  
 Particulars as to Soil, &c. ....  
 Cultivated or Spontaneous .....  
 When sown .....  
 By whom .....  
 When Seedling collected .....

BOTANIC GARDENS, SYDNEY.

EUCALYPTUS SEEDLINGS.

Species .....  
 Locality .....  
 Collector and Date .....  
 Number of Schedule .....  
 Date of Sowing .....  
 Germinated .....  
 Date of Examination of Seedling .....  
 Hypocotyl .....  
 Cotyledons .....  
 Stem .....  
 First Leaves .....  
 Leaves .....

Further Remarks .....

## 5. NOTES ON THE DESCRIPTIONS.

Following is the order followed in the description of a seedling (beginning p. 132):—

1. Hypocotyl.
- 1a. „ (Miss Flockton).
2. Cotyledons (Petiole, Taper).
- 2a. „ (Undersurface, Miss Flockton).
3. Stem.
4. 1st Pair of Leaves (Shape, vestiture).
- 4a. „ (Petiole).
- 4b. Number of peltate leaves.
5. Subsequent pairs of leaves (Number, petiole, shape, vestiture).
6. Intermediate Leaves.
- 6a. Miss Flockton's Notes.

### a. Oil-glands.

In a few cases a roughened or glandular appearance has been attributed to oil-glands, but this may not have been scientifically ascertained. Oil-glands are more or less plentiful in most parts of every Eucalyptus plant, and the slight asperities in seedlings are usually to be attributed to stellate and other hairs.

### b. Hairs.

These are more or less distributed in seedlings, as may be noted under the descriptions. Examples will be found under *Renantheræ*, Small Cotyledons (Groups 1 and 2), *Bisectæ* (Group 15). See also Part LVI, p. 321.

### c. Tubercular Growths.

The subject has been touched upon at Part XLIX, p. 283. It is probable that they may make their appearance in all species, given favourable conditions, but they have been observed, naturally very small, in the axils of the cotyledonary leaves of very many species, perhaps all. The species of bacteria concerned in the infections, the shapes, &c., of the resulting growths, and other matters, will form the subjects of further inquiry by a bacteriologist.

### d. Colour.

During the years, the terms used by the artist and botanist for the anthocyanin colours of hypocotyl, cotyledon, &c., have varied. No tint should have been quoted except with quotation of a standard reference-work on colours. That has been quite out of the question with the time at my disposal, and doubtless some future student will carefully record these colours, and draw conclusions from his researches. In the notes on seedlings, red sometimes means crimson and pink, and there are doubtless other synonyms. Purple is also a term which covers much variation. (Some observations on the colours of the young shoots, or "young foliage," will be found at Part LVI, p. 331.)

The undersurface of the cotyledons (cotyledonary leaf) varies in colour according to local conditions, *e.g.*, time of year, moisture, soil. This is probably true of other parts of the seedling.

In a number of cases the colours in seedlings of the same species (or reputed to be such) from different localities are reported to be uniform; in some a difference is reported, but what interpretation is to be put on these reputed differences, if any, is a matter for further observation.

### e. Glaucescence.

The seedlings of some species, other than those whose mature leaves are glaucous, display glaucousness in varying degrees. Sometimes the glaucousness is hard to detect, as it may shade into paleness in which no waxy surface is evident to the eye. The term sub-glaucous is an intermediate one, and somewhat vague. For references to glaucescence in both young and mature foliage, see Part LVI, p. 328.

### f. Measurements.

These have been rarely given. Lubbock gives them in the few species he examined, but as I submit coloured drawings (and hope to reproduce more), I consider they will afford sufficient data for the present.

The sizes of the component parts of seedlings actually given are those of pot-grown ones. Speaking generally, it seems to be a fact that those grown in the open (*i.e.*, naturally grown) are larger; but I have not made a rigid series of comparisons. The whole question of measurements could form the subject of a useful research.

I have given localities or numbers after a description, so that the origin of the seedlings can be traced. It is purely a herbarium memo. Where there are no such indications, only one locality is known for the species.

One reason why these records are incomplete is that, during a generation, seedlings have disappeared at various stages through accident, climatic changes, attacks by insects and animals, and the various happenings of a nursery. In one case, a larger number disappeared, one knows not where; they were probably distributed with others for some public purpose. In some cases seeds produced weakly plants; in others, the quantity was so very small as not to permit a second sowing. But the work has been begun, and will go on.

While there have been very many advantages in conducting these seedling researches in the nursery of a public institution, I have many a time sighed for the greater security and privacy of a private garden.

## 6. NOTES ON THE EMBRYO.

(Including notes on Cotyledons, &c., which have been dealt with under separate headings.)

"We must first of all distinguish between seed-leaves and shoot-leaves, with regard to their point of origin from the stem. The former only occurs in the embryo, the latter in all those structures comprised under the term "shoot." The embryo which has developed from the fertilized egg-cell in the embryo-sac presents in many instances a tissue-body in which as yet no trace can be recognised of a differentiation into stem and leaf, or rather the embryo, when it leaves the fruit-capsule, is like a stem in which all indication of leaves is absent. . . ."

"In the majority of instances, however, a distinct differentiation can be recognised in the embryo hidden in the seed, and one or two leaves may be seen issuing from the tissue-mass which forms the axis of the embryo. These are the *seed-leaves* or *cotyledons*.

The short axis or stem-portion from which the seed-leaves originate, and which looks like the pedestal of the cotyledons, is called the *hypocotyl*.

"At one end of the hypocotyl a tissue-mass is developed, termed the *radicle*, at the opposite end a tissue-mass named the *plumule*.

"The plumule is situated above the place where the cotyledon or pair of cotyledons issued from the hypocotyl. It is the rudiment of a new portion of the stem, which is situated above the cotyledons, and is called the *epicotyl*.

"The epicotyl thus originates from the apex of the hypocotyl, and the boundary between these two portions of the stem is the place of origin of the cotyledon, or pair of cotyledons." (Kerner and Oliver, i, 596.)

Speaking of the embryo in *Eucalyptus*, Bentham says:

"Embryo with broad cordate 2-lobed or bipartite cotyledons, folded over the straight radicle, but otherwise flat." (*B.Fl.*, iii, 185.)

"The embryo in *Eucalyptus* appears always to have the cotyledons folded over the radicle, but varies much in the shape of the cotyledons, very broad or rather narrow, entire, cordate, 2-lobed or 2-partite, and in the comparative length of the radicle, and these differences are very likely of specific constancy; but there are but two or three species in which I have been able to examine the embryo taken from several specimens, and not many where I have had perfect seeds enough to spare more than one or even a single one for dissection. I have, therefore, thought it very unsafe to rely upon any of the modifications observed for specific distinction." (p. 188.)

Mueller ("*Eucalyptographia*") merely says: "Embryo of amygdaline consistence," and figures it as follows:—

*E. buprestium*, 10 (*in situ*); 11, cotyledons slightly unfolded, laying free part of the radicle; 12, transverse section of embryo.

*E. calophylla*, 11, embryo; 12, cotyledons unfolded; 13, transverse section of embryo.

*E. capitellata*, 10, embryo; 11, the same uncoiled.

*E. cladocalyx* (*corynocalyx*), 10, embryo; 11, the same unfolded.

*E. cosmophylla*, 11, embryo in its natural position; 12, transverse section of an embryo; 13, embryo, with cotyledons unfolded.

*E. crebra*, 10, embryo.

*E. diversicolor*, 13, embryo; 14, cotyledons unfolded, to exhibit the radicle.

*E. erythrocorys*, 10, embryo.

*E. ficifolia*, 11, embryo *in situ*; 12, embryo uncoiled; 13, transverse section of embryo.

*E. gamophylla*, 11, 12, 13, as in *E. ficifolia*.

*E. globulus*, 11, 12, 13, as in *E. ficifolia*.

*E. goniocalyx*, 11, embryo.

*E. leucozydon*, 13, embryo.

*E. marginata*, 11, embryo *in situ*; 12, embryo uncoiled.

*E. megacarpa*, 12, embryo *in situ*; 13, cotyledons partly spread out, to exhibit the radicle; 14, transverse section of embryo.

*E. miniata*, 10, embryo *in situ*; 11, side view of cotyledons; 12, transverse section of embryo.

*E. obliqua*, 10, embryo; 11, the same partly uncoiled.

*E. Sieberiana*, 11, embryo uncoiled; 12, embryo in its natural position.

*E. Watsoniana*, 11, embryo *in situ*; 12, transverse section of the same; 13, embryo unfolded, to show the cotyledons and radicle.

Lubbock "*On Seedlings*," (1892, p. 524) says:

"The embryos of species of *Eucalyptus* coming under my notice are remarkable for the way in which the cotyledons are deflexed and become folded or coiled round the *radicle*. The latter is straight in *E. globulus* (fig. 338, not reproduced), as are the petioles for part of their length, while the upper portion is bent at right angles to reach the base of the cotyledons. The whole length of the seed is occupied by the radicle, the straight portion of the petioles, and the real length of the *cotyledons*, which is not great. The

size of the latter, and their lobed appearance is due to their being deflexed and growing in a lateral direction till they reach the base of the seed, while their apical edge becomes coiled round the radicle. The middle portion through which the midrib runs cannot coil round the radicle, and is therefore short, thus giving rise to the *apical sinus*. This will be better understood by reference to the seedlings. A closely similar or identical case occurs in *E. marginata*, a transverse section of which shows the manner of coiling round the radicle. Although the section showing the coil is transverse to the seed, it is really through the longitudinal plane of the cotyledons. *E. stellulata* (fig. 341, not reproduced) has very much smaller and narrower seeds, and the coiling is therefore less extensive. The radicle is club-shaped, thickest at the point, and central to the cotyledons. . . .”

He describes at length the embryo of two species:

*E. globulus*: “Straight, or nearly so, fleshy, colourless, occupying the whole interior of the seed, and conforming to it in general outline; cotyledons broader than long, deflexed and convolute over the radicle, which the lobes equal in length; half of one cotyledon lies over half of the other, and consequently only one-half of each cotyledon lies against the testa; radicle long, stout, fleshy, truncate, at the end where it lies against the testa, otherwise wholly enclosed by the longitudinally coiled cotyledons, parallel with the axis and consequently some distance from the hilum.” (i, 530, with fig.)

*E. stellulata*: “Straight, filling the interior of the seed, colourless; cotyledons transversely oblong convolute and folded round the radicle; radicle long, stout, truncate at the apex, occupying the centre of the seed and enveloped by the cotyledons.” (p. 532.)

Dr. Cuthbert Hall in *Proc. Linn. Soc., N.S.W.*, xxxix, 476, 1914, says:

“*Embryo*.—As endosperm is not present, the form of the embryo depends on the shape, size and manner of folding of the cotyledons. The length of the petioles in the embryo depends on the distance from the junction of lamina and petiole to the superior pole of the radicle; and, in most species, is probably fairly short before germination. In *E. citriodora* and *E. maculata*, the cotyledons are almost sessile. In *E. marginata*, the hypocotyl is subterranean, and the failure of this to elongate, by growth in germination, is compensated for by the great elongation by growth of the petioles, so as to raise the laminae well above the ground. A similar condition obtains in *Angophora cordifolia*, where the hypocotyl is short, and the petioles long. *E. calophylla* and *E. Todtiana* also have fairly long petioles.”

See also the subject of the folding of the cotyledons in the embryo at p. 518, and compare with Lubbock's remarks already quoted above.

I had prepared some notes, but found that the subject required a series of enlarged drawings of embryos, which Miss Flockton has had no time to do. I commend the subject to the attention of a student.



### a. Historical.

Cotyledones (*sic.*) broad, much compressed, somewhat folded, undivided or bilobed, curved around the cylindrical straight erect radicle." ("Eucalyptographia," Preface.)

1866. Bentham (*B. Fl.*, iii) rarely refers to the Cotyledon. Exceptions are—

"Embryo with broad cordate 2-lobed or bipartite cotyledons, folded over the straight radicle, but otherwise flat." (p. 185.)

". . . varies much in the shape of the cotyledons, very broad or rather narrow, entire, cordate, 2-lobed or 2-partite . . ." (p. 188.)

One of the few specific references is under *E. cornuta*, "Cotyledons of the seeds very deeply lobed almost 2-partite."

1879-84. Mueller, in "Eucalyptographia," under *E. cornuta*, figures twenty-seven species of seedlings "to exhibit mainly the cotyledonary leaves." The seedlings are quite small, and as a rule also depict the first pair of leaves after the cotyledons. That of *E. sepulcralis* F.v.M. is figured on its own plate, and is the only seedling so found. Taken as a whole, the drawings of the seedlings are not quite satisfactory. The species depicted under *E. cornuta* are as follows:—

<i>E. alpina.</i>	<i>E. leucoxylon.</i>
<i>E. amygdalina.</i>	<i>E. macrocarpa.</i>
<i>E. botryoides.</i>	<i>E. marginata.</i>
<i>E. calophylla.</i>	<i>E. melliodora.</i>
<i>E. cornuta.</i>	<i>E. obliqua.</i>
<i>E. corymbosa.</i>	<i>E. pilularis.</i>
<i>E. cosmophylla.</i>	<i>E. piperita.</i>
<i>E. crebra.</i>	<i>E. rostrata.</i>
<i>E. diversicolor.</i>	<i>E. saligna.</i>
<i>E. gamophylla.</i>	<i>E. siderophloia.</i>
<i>E. globulus.</i>	<i>E. Sieberiana.</i>
<i>E. goniocalyx.</i>	<i>E. stricta.</i>
<i>E. Gunnii.</i>	<i>E. Stuartiana.</i>
<i>E. hemiphloia.</i>	

The next reference in order of date, if not actually prior to Mueller's, is as follows:—

1883. Naudin, of which I offer a translation:—

"In all species of Eucalyptus the cotyledons have a common physiognomy, which makes them easily recognised. They are always petiolate and opposite, their most habitual form is that of a heart, broader than long, having the two lobes separated by a hollowing more or less deep. In some species they are almost orbicular and entire, in others the median hollowing descends almost to the base of the limb, which is thus also divided into two straight and diverging lobes. These different modifications may help in the recognition of some species, however, it is not a criterion sufficiently constant and sure to be trusted in every case." (Naudin, i, 346, 1883.)

In other words, he issues a warning as to variation in cotyledons.

.1892. Lubbock.

"Most of the species of *Eucalyptus* observed have characters in common in the form of the cotyledons. They are transversely oblong, with or without a shallow sinus at the apex, with a short midrib terminating in the sinus, and a longer lateral nerve running along the centre of the lateral lobes. They are practically therefore trinerved; but the whole of the venation is sometimes obscure or indiscernible owing to the opacity of the cotyledons. The real apex of the latter is in the notch; and the length of the lateral lobes, together with the origin of the sinus is explained below. Species agreeing in the main with the above particulars are *E. globulus* (fig. 339), *E. rostrata*, *E. cordata*, *E. leucoxydon* (fig. 340), and *E. stellulata*. A slight modification of the above is seen in *E. coccifera* having small, obcordate cotyledons with a cuneate base. A greatly exaggerated form is met with in *E. occidentalis* (fig. 342), where the lateral lobes are ascending or suberect so as to give the cotyledons a furcate appearance strongly resembling those of *Pentapetes puniceus* (see fig. 219, not reproduced) amongst the *Sterculiaceæ*, with similar venation. The cotyledons of *E. ficifolia* are transversely oblong-reniform, with a moderately deep notch at the base, a very shallow apical sinus, the three nerves copiously branched, and long ascending petioles. On the whole, they may be compared to those of a *Geranium*. The long petioles show a transition to a still more remarkable type occurring in *E. marginata* (fig. 343, not reproduced), in which the hypocotyl is subterranean and extremely short, while this deficiency is compensated for by the length of the petioles. The lamina is obcordate, cuneate and trinerved, resembling a *Brassica*. A striking departure from the common type occurs in *E. calophylla* (fig. 344, not reproduced) having reniform-orbicular, incipiently emarginate, foliaceous cotyledons of great size. The three nerves are copiously branched, the lateral ones again having three main divisions." (Lubbock, i, 526.)

A similar or identical case occurs in *E. marginata*, a transverse section of which shows the manner of coiling round the radicle. Although the section showing the coil is transverse to the seed, it is really through the longitudinal plane of the cotyledons. *E. stellulata* (fig. 341) has very much smaller and narrower seeds, and the coiling is therefore less extensive. The radicle is club-shaped, thickest at the point, and central to the cotyledons." (Lubbock, "On Seedlings," i, 524.)

The descriptions he gives in connection with the cotyledons are fuller than those of any previous author, and include :—

- E. globulus*, deeply bifid, lobes obovate-oblong, diverging (with fig.).
- E. rostrata*, small transversely oblong, obtuse, entire, sometimes almost cordate at the base.
- E. cordata*, very similar to those of *E. rostrata*, shallowly emarginate.
- E. leucoxydon*, as in *E. rostrata*, but truncate at the end, or sometimes possessing a small apical tooth (with fig.).
- E. stellulata*, transversely oblong.
- E. coccifera*, shortly stalked, obcordate, cuneate at base, retuse at apex.
- E. occidentalis*, deeply bifid, petiolate, lobes oblong; narrow obtuse (with fig.).
- E. ficifolia*, reniform, obtuse, entire or slightly emarginate, cordate at the base.
- E. marginata*, sub-rotund or transversely oblong, obtuse, emarginate, asymmetrical petiolate (with fig.).
- E. calophylla*, large foliaceous, reniform-orbicular, petiolate, blunt, entire except at the base or incipiently emarginate (with fig.).

1894. Kerner and Oliver in 1894 (in translation, presumably earlier in the original) use the term *bisected* for the cotyledons of certain species of *Eucalyptus*, *i.e.*, No. 15 of fig. 148 (i, 621) for *E. orientalis* (a slip for *occidentalis*). No. 16 of the same figure is a reniform cotyledon of *E. coriaceous* (*coriacea*), but the word reniform is not used.

1914. Then follows an important paper by Dr. Cuthbert Hall, "The Evolution of the Eucalypts in relation to the Cotyledons and Seedlings" (*Proc. Linn. Soc., N.S.W.*, xxxix, 473, with thirty-two plates). The paper takes cognizance of nearly 150 species, and the cotyledons are attached to the seedlings, which are reproduced by photography, and naturally vary in sharpness with the age of the seedlings. Each seedling (species) is represented by one photograph. They are difficult to compare because the figures are crowded on the plates at various angles, and some are even reversed.

1899 onwards. My own seedling work began seriously in 1899, and has been uninterruptedly continued ever since and practically all through the year. Miss Flockton (from 1901 to 1919), and Miss Ethel King since that date, have made drawings in colour of all cotyledons, *as soon as they were unfolded*, and fresh drawings of the identical seedlings were made at various stages. These are in colour, and have developed some surprising results. They will be reproduced in due course.

Excellent examples of the various types of Eucalyptus Cotyledons are depicted in Part LXX, Plates 286-287.

### b. Poly- (tri-) cotyly.

*Poly- (tri-) phylly* (in the juvenile leaves, of course).

These aberrant conditions are apparently rare, and have been seldom recorded. Probably they are much more frequent than at present supposed. In one case I cite, tricotyly was traced to have preceded triphyly, and further inquiry may further reveal a connection between the two phenomena, but it is not invariably the case.

Dr. C. Hall has seen tricotyly in *E. coriacea*, *E. elaeophora*, *E. eximia*, *E. Bosistoana*, *E. pilularis*, *E. Stuartiana*, and *E. microcorys*. (*Proc. Linn. Soc., N.S.W.*, xxxix, 519, 1914.)

Following are the records that have come under my notice :—

1. *E. aggregata* Deane and Maiden. Triphyly. Guildford Junction, Tasmania (R. H. Cambage, No. 4,101). (See 5a, Plate 235.)
2. *E. calcygona* Turcz. Both tricotyly and triphyly. Yellana and Butler, Eyre's Peninsula, South Australia (W. J. Spafford, June, 1917, No. 3.)
3. *E. cordata* Labill. Cultivated plants sometimes show triphyly. (Botanic Gardens, Sydney, 17th September, 1919).
4. *E. cornuta* Labill. Triphyly rare. (A. D. Hardy, *Proc. Roy. Soc., Vict.*, xxviii. (New Ser.), p. 241.)
5. *E. corymbosa* Sm. I exhibited coloured drawings of seedlings showing tricotyly. (*Proc. Linn. Soc., N.S.W.*, xxxv, 523, 1910).
6. *E. eugenoides* Sieb. Triphyly. Capertee, N.S.W. (J. L. Boorman, September, 1915.)
7. *E. eximia* Schauer. Dr. C. Hall exhibited a seedling showing both tricotyly and triphyly. (*Proc. Linn. Soc., N.S.W.*, xxxv, 27, 1910.) Mr. P. R. St. John has sent me an excellent specimen showing tricotyly.

8. *E. Gillii* Maiden. A shoot (Botanic Gardens, Sydney, 11th April, 1919), has leaves at base, one in threes, then four whorls in twos, the rest in threes. The leaves connate. Ternate leaved alike in the seedlings and in the sucker leaves from a tree. Figured in Part LX, fig. 6, Plate, 247.
9. *E. goniocalyx* F.v.M. Triphyly. Quoted by Mueller in "Eucalyptographia" under *E. viminalis*.
10. *E. Johnstoni* Maiden. (*Muelleri* T. B. Moore). Botanic Gardens, Sydney (Coll. W. F. Blakely.)
11. *E. Muelleriana* Howitt. Triphyly rare. (A. D. Hardy, *loc. cit.*)
12. *E. pachyloma* Benth. Triphyly. Kalgan Plains, W.A. (J.H.M.)
13. *E. patens* Benth. For an instance of triphyly, see fig. 1, Plate 88, Part XX, of the present work.
14. *E. piperita* Sm. Triphyly in a tree at Hornsby, near Sydney (W. F. Blakely).
15. *E. radiata* Sieb. Triphyly figured at fig. 3, Plate 29, Part VI, as *E. amygdalina*. Triphyly about 1 in 100 of certain seedlings. (A. D. Hardy, *loc. cit.*)
16. *E. resinifera* Sm. } "Polyphyly. The undermentioned species yielded forms
17. *E. Risdoni* Hook. } with increase of foliar leaves supervening on tricotyly." In *E. resinifera*, triphyly in 1 in 530 of certain seedlings (p. 241). In *E. Risdoni*, triphyly in 1 in 100 of certain seedlings (p. 241). (A. D. Hardy, *Proc. Roy. Soc., Vict.*, xxviii (New Ser.), p. 242.)
18. *E. umbra* R. T. Baker. Cowan, near Hawkesbury River, N.S.W. (W. F. Blakely and D. W. C. Shiress.)
19. *E. viminalis* Labill. Case of triphyly shown in "Eucalyptographia" plate. See also a specimen from Lake St. Clair, Tasmania. (L. Rodway, 17th January, 1918.)

### c. Cohesion.

"Velenovsky mentions a seedling of *E. pulverulenta* in which one cotyledon only was present, as a consequence of which the foliage leaves above were alternately arranged. It is possible that each leaf in these cases represents a congenital fusion of two." ("Principles of Plant Teratology," Wordsell, i, 220.)

I do not think I have seen a seedling with only one cotyledon, except it has been removed by an accident, but alternately arranged leaves immediately above the cotyledons are not rare.

We have cohesion of cotyledonary leaves in *E. punctata* DC., the seed from Como, Sydney (J. L. Boorman and W. M. Carne). I have also seen it in *E. setosa* R.Br. (Northern Territory), forming a symmetrical cup. I have not specially searched for this form of cohesion.

### d. Margin.

In the same plant we may have one cotyledon strictly reniform (marginate), and the other more or less emarginate.

If the three principal groups of cotyledon leaves be studied, it will be seen that they chiefly differ in the degree of emarginateness; in other words, in examining a complete series of Reniformæ and Bilobæ (which two groups contain a minimum amount of it), and of Bisectæ (which contain it in its extreme form), we have a perfect series.

Amongst a number of individual species there is so much variation that it is difficult, and sometimes impossible, to separate them on their emarginate character, or lack of it.

“ The cotyledons are transversely oblong, with or without a shallow sinus at the apex, with a short midrib terminating at the sinus . . . .” (Lubbock, i, 525.)

Dr. Cuthbert Hall (*op. cit.*, p. 478) has made the question of entire and emarginate cotyledons of some importance. He even makes it a basis of classification :—

#### I. Entire Cotyledons.

(a) Bloodwoods or Corymbosas, characterised by very large or medium-sized cotyledons, usually reniform in shape, and resembling those of the Angophoras.

(b) Of medium size to small, reniform, entire . . . . mainly Stringybarks with reniform anthers.

(c) Small, reniform or orbicular. *E. dumosa*, *E. populifolia*, *E. quadrangulata*, *E. polybractea*, (*fruticetorum*), *E. incrassata*.

#### II. Emarginate Cotyledons.

(a) Large, obcordate, cuneate at base, petioles long, *E. marginata*, *E. Todtiana*, *E. megacarpa*, *E. santalifolia* (*diversifolia*). The lastnamed shades off into the following group.

(b) Medium to small, emargination moderate, slight or even practically absent. . . . In most cases, the undersides of the leaves and cotyledons are tinged deep purplish-red. Most of the species contain Eucalyptol (cineol), and many phellandrene and piperitone. The anthers are generally reniform.

(Then follows a list of species all of which are Renantheræ except *E. striatocalyx*. It includes *E. Planchoniana*.)

(c<sup>1</sup>) Smaller, more or less transversely oblong, emargination moderate or very slight. . . . In this group may be placed the Ironbarks and most of the Boxes with anthers opening by pores; the remainder mostly have parallel anthers.

(c<sup>2</sup>) Very small, transversely oblong or triangular, emargination slight or practically absent . . . . Where the petiole is so small, it is sometimes almost impossible to know whether to put some of these in this group or in (I (c)).

(The members of this group are moderately variable as regards anthers.)

(c<sup>3</sup>) Larger than in II (c<sup>1</sup>), more deeply emarginate, lobes obovate-oblong, obtuse, divergent. . . . It will be seen that this group shades off from (c<sup>1</sup>), just as (c<sup>2</sup>) may be taken to shade off from (c<sup>1</sup>) in the other direction. Comprised in it are *E. eudesmioides*, *E. gomphocephala*, *E. Lehmanni*, *E. cosmophylla*, *E. cladocalyx*, *E. hemilampra*, *E. elæophora*, *E. goniocalyx*, *E. urnigera*, *E. unialata*, *E. Maideni*, *E. globulus*.

### e. Venation.

“ . . . . with a short midrib terminating in the sinus, and a longer lateral nerve running along the centre of the lateral lobes. They are practically, therefore, trinerved, but the whole of the venation is sometimes obscure or indiscernible owing to the opacity of the cotyledons.” (Lubbock, i, 525.) Venation is a character taken cognisance of in the seedlings, when describing the cotyledons.

*Subsequent pairs of leaves* (No. 5).—All pairs beginning with the second pair and ending just before the alternate leaves. There is considerable range in the number of pairs and in their shape.

*Number of Opposite Leaves.*—Stress has been laid on the number of pairs of opposite leaves in a seedling, before the alternate-leaved stage is reached. The large number of narrow opposite leaves in *E. viminalis* and *E. radiata*, and of broad ones in *E. Stuartiana* and *E. Gunnii*, arrest the attention of every intelligent stroller in the bush, while the fact that some species (*e.g.*, *E. paniculata* and *E. corymbosa*) change so rapidly to the alternate-leaved stage that one can rarely obtain opposite leaves of them, except after careful and perhaps prolonged search, is known to fewer observers.

This persistence in oppositeness, or in refusal “to grow up,” is instructive. Such species as *E. viminalis* and *E. Stuartiana* are physiologically retrograde, while *E. paniculata* belongs to a group more progressive in the cycle of life.

*Intermediate Leaves* (6) and 6a (*Miss Flockton* (6a)).—In some cases there may be some repetition here, but we have the advantage of two sets of facts made by different observers, and they may be looked upon as supplemental or corroborative as a rule. Miss Flockton's observations were invariably made from the seedling in the pot as she drew it, gazing at it again and again.

Intermediate leaves indicate all leaves from the last pair of opposite leaves to the lanceolate or adult leaf. There is a great range of variation in these leaves, as shown in the figures, and they are directly comparable with the intermediate leaves of the shoot as shown at Part LXVI, p. 307, Plates 270–271. At the same time, it may be proper to point out that the intermediate leaves of the shoot, as thus defined, have a wider range than those of the seedlings as defined above. In other words, in the intermediate leaves of the shoot we adopt the convention of including all shapes and sizes of leaves between the earliest and the latest, while in the seedling it becomes necessary, as a matter of convenience, to restrict the intermediate leaves in the manner stated. But the two kinds of intermediate leaves are strictly correlative.

Some seedlings show alternate leaves immediately after the cotyledons—some of the *Corymbosæ*, for example. They seem irregular or anomalous in the present state of our knowledge, but our acquaintance with them is increasing.

They may be alternate and then opposite, before they finally become alternate. Indeed, there may be two forms of leaves, each strictly opposite in character, before they proceed to the alternate stage. They can also be petiolate and then sessile before they finally become petiolate.

N.B.—In the *Corymbosæ* and *Eudesmiæ* the intermediate leaves start from the last peltate leaf.

Where the name of Miss Flockton occurs in brackets, with the detailed descriptions of seedlings, it means that these are the notes made by that artist at the various times each seedling was brought to her for drawing. (In a small percentage of cases the notes were made by the ladies who made drawings under Miss Flockton's supervision.) These notes extend over twenty years, and I prefer to copy them as they stand, rather than attempt to bring them into uniformity in 1923. I think they will be more useful as impressions made at the time, and hope that very many more such notes will be made by future workers.

## DETAILED DESCRIPTIONS OF SEEDLINGS.

### DIVISION RENIFORMÆ.

#### SECTION 1.—LARGE COTYLEDONS.

- 1a. Corymbosæ—Peltatæ (with peltate leaves).
- 1b. Corymbosæ—Non-Peltatæ (without peltate leaves).
- 1c. Non-Corymbosæ (*E. marginata*, *E. sepulcralis*, *E. Todtiana*, *E. buprestium*, *E. Planchoniana*).

### DIVISION RENIFORMÆ.

#### Section Large Cotyledons.

#### SERIES 1a.—CORYMBOSÆ—PELTATÆ.

(With peltate leaves.)

*E. calophylla*.

*E. hæmatoxylon*.

*E. ficifolia*.

*E. eximia*.

*General Appearance*.—Leaves short and broad, varying from orbicular to ovate or ovate-lanceolate, peltate, slightly crinkled and stellate in the early stages; petiole short or long, usually long when peltate. The general tone is a light-green, shading to darker green, faintly tinged with purple-brown. Stems pale green to purple-brown, usually setose up to 12 inches in height, then smooth.

When the intermediate-leaved stage is reached, the venation is much finer than in the early stages. The colour, however, is about the same, but the stem and also the petioles are often a much deeper purple-brown.

#### (1) *Hypocotyl*.

*E. calophylla*, erect, terete, reddish, densely covered with blunt, warty, glandular processes, about 1.3 to 1.5 cm. above the soil. (Lubbock.)

*E. ficifolia*, erect, terete, covered with short bristly hairs 2.5 to 3 cm. long, reddish. (Lubbock.)

*E. calophylla*, short, thick, glandular.

*E. ficifolia*, short, stout, glandular.

*E. hæmatoxylon*, short, stout, glandular.

*E. eximia*, medium, slender, smooth.

#### (1a) *Hypocotyl* (Miss Flockton).

*E. calophylla*, short, thick, tinted pink and covered with warty glands (Woods and Forests, Perth); pink, with a few glandular hairs (W.A. No. 4).

Var. *rosza*, terete, red, with some glandular processes near the top (Melbourne); terete, red, sometimes with warty glands (Rydalmere).

*E. ficifolia*, tinted pink; has a few scattered glands (Botanic Gardens, Sydney); long terete, red, smooth or with a few glands (Victoria Lodge, Botanic Gardens, Sydney).

*E. hæmatoxylon*, tinted pink, covered with warty glands, thickening to the base.

*E. eximia*, terete, pink or red (Gosford); terete, shaded pink, warty glands, thickening to the root (Berowra, No. 1); terete, pink, with scattered warty glands, thickish (No. 2).

(2) *Cotyledons*.

*E. calophylla*. Large, foliaceous, reniform-orbicular, petiolate, blunt, entire except at the base or incipiently emarginate, glabrous, deep opaque green and punctate above, much paler beneath and more conspicuously punctate, strongly trinerved from the base, with the lateral nerves trifurcate a little above the base, and ascending while the midrib proceeds nearly straight to the apex, with a few alternate, ascending branches; lamina 2.3 cm. long, 3 cm. wide; petiole subterete, flattened on the upper side above the base and shallowly grooved upwards, much thickened and perfoliate at the base, densely covered with small glandular processes, about 1.6 cm. long (Lubbock.)

*E. ficifolia*. Reniform, obtuse, entire or slightly emarginate, cordate at the base, coriaceous, petiolate, glabrous except on the petioles, which are covered with short, bristly hairs, dark green, reddish beneath, palminerved. (Lubbock.)

*Cotyledons* (petiole; taper; vestiture).

*E. calophylla*. More or less glandular, broad reniform, slightly emarginate, lobed at base, 5-7 nerved, slightly tapering into the slender, glandular petiole, 37 mm. long, 30 mm. broad. (Perth.)

*E. ficifolia*. More or less glandular, broad reniform, slightly emarginate, lobed at base, 5-nerved, slightly tapering into the slender glandular petiole, 28 mm. long, 25 mm. broad. (Botanic Gardens, Sydney.)

*E. hæmatoxylon*. More or less glandular, broad reniform, undulate, slightly emarginate, lobed at base, 3-5 nerved, slightly tapering into the rather stout glandular petiole. (Forests Department, Perth.)

*E. eximia*. Smooth, broad reniform, not or slightly emarginate.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. calophylla*, with warty glands on the petiole, undersurface purple.  
var. *rosea*, crimson, petioles glandular.

*E. ficifolia*, crimson (1); red, prominent glands on petioles (2).

*E. hæmatoxylon*, undulate, purple.

*E. eximia*, red, deep red, deep crimson.



(3) *Stem.*

*E. calophylla*. Erect, terete, ultimately woody, green in the young state, densely covered with irregular crystalline, glandular processes; first internode 2.25 cm. long; second 5–6 mm. (Lubbock.)

*E. ficifolia*. As in *E. occidentalis* Endl., but covered with bristly hairs; first internode 2–3.5 cm. long, second 1–2 cm. (Lubbock.)

(Miss Flockton.)

*E. calophylla*. Green, tinted pink, prominent glandular hairs (4).

*E. ficifolia*. Covered with long glandular processes (Botanic Gardens, Sydney); terete, with prominent glands, green, shaded pink (Victoria Lodge, Botanic Gardens, Sydney); strong, hardy-looking, terete, red (Teneriffe).

*E. hæmatoxylon*. Tubular, pale green tinted with pink, covered with red glandular hairs getting fewer towards the top (Jarrahwood).

*E. eximia*. Terete, shaded red, covered with pink glandular processes (Gosford); tinted red, warty glands above the cotyledons (Berowra); mauve, with long, irregular, transparent glands (Berowra, 1913).

“Seedlings (primary leaves).”

*E. calophylla*, covered on both surfaces with crystalline glands (Lubbock).

(4) *First pair of Leaves* (petiole, shape, vestiture).

*E. calophylla*, one, petiolate, orbicular, larger than the cotyledons, setose.

*E. ficifolia*, one, petiolate, ovate to nearly orbicular, large, but smaller than the cotyledons, setose.

*E. hæmatoxylon*, two or more, petiolate, ovate to nearly orbicular, larger than the cotyledons, setose.

*E. eximia*, two, petiolate, lanceolate to broad-lanceolate, rather large, about the size of the cotyledons, setose.

(4b) *Number of Peltate Leaves* (shape, vestiture).

*E. calophylla*, six or more, ovate to ovate-lanceolate, undulate, hispid, pale on the lower surface, veins few, rather distant. At 15 inches high, 5 to 8 cm. long, 4 to 5 cm. broad, light-green tinged with purple-brown; petiole setose, slender, 2 cm. long. Stem setose, at first terete, but angular at 8 inches, purple-brown throughout. (Foot of Stirling Range.)

*E. ficifolia*, at least ten, ovate to ovate-lanceolate, somewhat stellate on both surfaces in the early stages, slightly undulate, the margins glandular-denticulate, 2 to 6 cm. long, 2 to 3.5 cm. broad, light green. Petiole setose, 2 cm. long. Stem setose, pale green, tinged with purple-brown (Botanic Gardens, Sydney.)

*E. hæmatoxylon*, eight, ovate to ovate-lanceolate, apiculate, fairly densely hispid-setose, ranging from 3.5 cm. long and 2 cm. broad to 8.5 cm. long and 5 cm. broad, light green, veins distant, spreading and rather prominent. Petiole short, covered with purple brown seta. Stem setose, green or the seta purple-brown. (Jarrahwood.)

*E. eximia*, six or more, leaves ovate to narrow-lanceolate, slightly undulate; at 6 inches high, 4 cm. long, 2 cm. broad; olive green, shaded purple brown, veins more or less prominent. Petiole slender, glandular, hairy, about 15 mm. long. At 9½ inches, narrow lanceolate, quite smooth, 7 to 10 cm. long, 2 to 2.5 cm. broad, light-green tinged with a dull purple-brown. (Gosford.)

*E. calophylla*. Leaves opposite in the young plant, covered on both surfaces and at the margin, but especially on the petioles and midrib beneath, with various-sized crystalline, glandular processes, rather closely and ascendingly penninerved and reticulate; petioles dilated and slightly flattened on the upper side at the base, otherwise nearly terete and tapering upwards. First pair broadly cordate, obtuse, tipped with a glandular mucro. Second pair cordate-ovate, obtuse, tipped with a glandular mucro, alternate. (Lubbock.)

*E. ficifolia*. First leaves as in *E. coccifera*, but covered with numerous bristly hairs, tinged with red below, pinnatinerved. The leaves in many specimens are alternate, not opposite, the internodes between the pairs of leaves at first being very short, but increasing in length after the second pair. (Lubbock.)

#### (6) *Intermediate Leaves.*

*E. calophylla* var. *rosea*, ovate lanceolate, undulate, the apex rather long, petiole short. At 8½ inches, 5 cm. long, 2 cm. broad, light green, margin shaded purple-brown, also the petiole, veins obscure. Young tips a rich purple-brown. Stem pale green shading into pale purple-brown. (Cultivated, Rydalmere, N.S.W.)

*E. ficifolia*, leaves oblong-lanceolate, undulate, thick, with a short sharp mucro, petiole short, but longer than in *E. calophylla*. At 10 inches, 6 cm. long, 2.5 cm. broad, light green, veins obscure, midrib and petiole purple-brown. Stem purple-brown. (Botanic Gardens, Sydney.)

*E. hæmatoxylon*, leaves oblong lanceolate, undulate, the apex short, recurved petiole long. At 18 inches, 9 cm. long, 3.5 cm. broad, dark green, midrib white, veins obscure, petiole purple-brown, also the stem. (Busselton, Dr. F. Stoward.)

At 29½ inches broadly elliptical, slightly undulate, apex short, very acute, petiole rather long, purple-brown, the colour extending partly into the midrib, the remainder of the midrib whitish, shaded yellowish green. General colour of leaf a light green, veins fine, scarcely prominent. Stem a rich purple-brown. (Jarrahwood, Western Australia.)

*E. eximia*, leaves lanceolate, mucro, short, slightly undulate, veins obscure, petiole long, compressed. At 20 inches, 14 cm. long, 4.5 cm. broad, glaucous green, petiole and midrib yellowish. In this species some of the leaves are hastate to auriculate at the base. Hastate leaves are also present in other species. Stem a dull purple brown. (Gosford.)

(6a) (Miss Flockton).

*E. calophylla*.

1st leaves broadly ovate, glandular hairs scattered on the edges, midrib, &c. (No. 4). 1st alternate leaves the same, but larger and all are peltate (No. 4).

var. *rosea*. 1st leaves ovate, undersurface purple tint (Rydalmere).

*E. ficifolia*.

1st leaves ovate, undersurface pale glaucous green, with protuberant glands scattered on midrib and edges. 1st alternate leaves the same, but larger and sometimes becoming peltate. (Botanic Gardens, Sydney.)

Leaves alternate,  $5\frac{1}{4}$  inches long by  $2\frac{1}{2}$  inches wide, sinuous, peltate, midrib red, intramarginal vein close to the edge. (Teneriffe.)

1st leaves ovate, undersurface pale green, dotted and edged with transparent glands. This plant is covered with prominent glands except on the cotyledon leaves. (Victoria Lodge, Botanic Gardens.)

*E. hæmatoxylon*.

1st leaves ovate-cordate, peltate, with pink glandular hairs on the petioles, principal veins and margins. 1st alternate leaves ovate cordate, peltate, mucronate, fewer hairs. After the plant has attained to 7 or 8 inches the leaf changes, the venation becomes closer and more regular, the edge more wavy, no longer peltate-mucronate and without hairs. The intramarginal vein is almost lost in the extreme edge of the leaf. The seedlings are not always peltate. (Woods and Forests Department, Western Australia.)

*E. eximia*.

1st leaves ovate, petiolate, underside pale opaque green. Leaves ovate, peltate, irregular in shape, with pink bristly hairs on the midrib and scattered on the leaves, chiefly on the upper side, underside slightly paler. Petiolate, decussate, alternate after the first or second pairs. (Gosford.)

1st leaves ovate, undersurface purple shade and pink glands on both sides, very thick on the young growth. 1st alternate leaves ovate acuminate, midrib pink, peltate, glandular hairs on midrib and peduncle. (Berowra.)

## SERIES 1B. CORYMBOSÆ—NON-PELTATÆ.

(Without peltate leaves.)

*E. Foelscheana*.*E. ptychocarpa*.*E. miniata*.

*General Appearance*.—Leaves short and more or less obtuse, petiolate, ovate to lanceolate, smooth or hispid, sub-glaucous. In *E. miniata* the hypocotyl is submerged.

(1) *Hypocotyl*.*E. Foelscheana*, medium, stout, smooth.*E. ptychocarpa*, very short, stout, glandular.*E. miniata*, submerged or very short.(1a) *Hypocotyl* (Miss Flockton).

*E. Foelscheana*, terete, short, shaded red, Darwin (Baldwin Spencer); terete, slightly warty, sturdy and short, tinted pink (Edith Creek).

*E. ptychocarpa*, pale yellow green, sturdy, with warty protuberances (Northern Territory).

*E. miniata*, terete, short, thick, pale green and pink below the ground line. (Seed, Brisbane.)

(2) *Cotyledons* (petiole, taper).

*E. Foelscheana*, smooth, broad reniform, very slightly emarginate, slightly lobed at base, not tapering, 5-nerved, petiole slender, 20 mm. long, 15 mm. broad. (Edith Creek, Northern Territory).

*E. ptychocarpa*, more or less glandular, broad reniform, scarcely emarginate, 3-nerved, very slightly lobed at base, not tapering into the petiole, petiole slightly glandular, 18 mm. long, 11 mm. broad. (Bathurst Island.)

*E. miniata*, smooth, broad reniform, scarcely emarginate, slightly lobed at base, slightly tapering into the long, slender, smooth petiole, 25 mm. long, 17 mm. broad. (Northern Territory, per H. Steedman.)

(2a) *Cotyledons* (Undersurface, Miss Flockton).*E. Foelscheana*, green.*E. ptychocarpa*, pale green, petioles warty.*E. miniata*, green, a little deeper on the upper surface.

(3) *Stem.*

*E. Foelscheana*, terete with prominent glands (No. 27, Northern Territory); spindly, with prominent glandular processes (Edith Creek).

*E. ptychocarpa*, pale green, covered with glandular processes (Northern Territory).

*E. miniata*, terete, light yellow green with stellate hairs (H. Steedman); terete, green, covered with stellate hairs (Darwin); terete, pink, covered with stellate hairs (Northern Territory, from Botanic Gardens, Brisbane.)

(4) *1st pair of leaves* (petiole, shape, vestiture).

*E. Foelscheana*, six, petiolate, lanceolate to ovate, not half the size of the cotyledons.

*E. ptychocarpa*, six, petiolate, slightly setose, lanceolate to ovate, much smaller than the cotyledons.

*E. miniata*, six, petiolate, lanceolate to ovate, longer but narrower than the cotyledons, setose.

(5) *Subsequent pairs of leaves* (Number, petiole, shape, vestiture).

*E. Foelscheana*, six or more, ovate to ovate-lanceolate, setose or hispid.

*E. ptychocarpa*, at least six.

*E. miniata*, six or more, oblong to oblong-lanceolate, slightly stellate, pale green, petiole short.

(6) *Intermediate Leaves.*

*E. Foelscheana*, not seen.

*E. ptychocarpa*, opposite, ovate-lanceolate, obtuse, the lamina upturned, undulate, veins rather prominent, petiole short, compressed. At 32 inches still opposite, 10 cm. long, 5 cm. broad. (Northern Territory, W. S. Campbell.)

*E. miniata*, not seen.

## (6a) (Miss Flockton.)

*E. Foelscheana*.

*1st leaves* ovate, the edges and midrib bearing long, colourless glandular processes (Northern Territory); small ovate, the edges and midribs with a few prominent glands (Edith Creek).

*E. ptychocarpa*.

*1st leaves* ovate-orbicular, oval. Leaves  $2\frac{1}{2}$ –3 inches long, still opposite, plant 8 inches high (Northern Territory).

*E. miniata*.

*1st leaves* ovate-lanceolate, with stellate hairs (H. Steedman).

(*1st leaves* ovate-lanceolate, with stellate hairs (Darwin, H. Brown).

*1st leaves* ovate lanceolate, with stellate hairs (Northern Territory, from Botanic Gardens, Brisbane).

## SERIES 1C.—NON-CORYMBOSÆ.

*E. marginata.**E. Planchoniana.**E. Todtiana.**E. sepulcralis.**E. buprestium.*

*General Appearance.*—Leaves orbicular, oblong to lanceolate, shortly petiolate or sessile, slightly crinkled in the very early stage, flat, or undulate when more advanced, light to dark green or glaucous shaded pink, the veins more or less prominent. Stems usually purple-brown.

In the intermediate stage *E. Planchoniana* is the only one of this series which shows a marked affinity to the Corymbosæ in the venation, but it is interesting to note that there is a total absence of seta in this species, as well as in the rest of the series, which forms a group with more or less closely corresponding characters in the seedling, but differing materially in other respects.

(1) *Hypocotyl.*

*E. marginata.* “The hypocotyl is subterranean and extremely short, while this deficiency is compensated for by the length of the petioles.” (Lubbock.)

*E. marginata*, very short or submerged.

*E. Todtiana*, short, stout, smooth, reddish.

*E. Planchoniana*, medium to long, stout, reddish.

*E. sepulcralis*, long, slender, reddish.

*E. buprestium*, long, slender, reddish.

(1a) *Hypocotyl* (Miss Flockton).

*E. marginata*, almost without hypocotyl, the stem sometimes springing up from below the surface of the ground (217).

*E. Todtiana*, short, terete, reddish.

*E. Planchoniana*, thick, red (8-Mile Plains); terete, sturdy, red (Stradbroke Island).

*E. sepulcralis*, sturdy, terete, red.

*E. buprestium*, smooth, red.

(2) *Cotyledons.*

*E. marginata.* Subrotund or transversely oblong, obtuse, emarginate, asymmetrical petiolate, coriaceous, glabrous, dark green, reddish beneath, distinctly trinerved; petioles long, plano-convex, stained with red (Lubbock).

(Petiole, taper.)

*E. marginata*, somewhat cuneate-reniform, slightly emarginate, tapering into the very long petiole.

*E. Todtiana*, broad reniform, slightly emarginate, tapering into the petiole, 18 mm. long, 12 mm. broad; petiole medium, light green, trinerved.

*E. Planchoniana*, broad reniform, slightly emarginate, tapering into the medium petiole, 18 mm. long, 12 mm. broad, trinerved, light green, purple-brown beneath.

*E. sepulcralis*, somewhat cuneate-reniform, tapering to about into the short petiole for about half its length, slightly emarginate, 17 mm. long, 13 mm. broad, trinerved, light green.

*E. buprestium*, broad reniform, slightly emarginate, tapering into the very short petiole, 25 mm. long, 18 mm. broad, veiny or about 7-nerved, glaucous green.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. marginata*, slight purple tint.

*E. Todtiana*, purple.

*E. Planchoniana*, deep crimson (8-Mile Plains); purple-red (Stradbroke Island)

*E. sepulcralis*, rich puce.

*E. buprestium* crimson.

(3) *Stem*.

*E. marginata*. As in *E. ficifolia* (Lubbock). (Miss Flockton.)

*E. marginata*, tinted pink (No. 217).

*E. Todtiana*, thick red.

*E. Planchoniana*, smooth red (8-Mile Plains).

*E. buprestium*, smooth, tinted red (Kalgan Plains).

(4) *1st pair of leaves* (Petiole, shape, vestiture).

*E. marginata*. Sessile, coriaceous, ovate-lanceolate subacute, glabrous, light green, distinctly pinnatinerved. (Lubbock).

*E. Todtiana*, shortly petiolate or almost sessile, oblong lanceolate, slightly undulate, 4.5 cm. long, 2.5 cm. broad, light green, glabrous (Perth, Western Australia).

*E. Planchoniana*, distinctly but shortly petiolate, narrow-lanceolate, slightly undulate, 4.5 cm. long, 1.5 cm. broad, subglaucous, glabrous (8-Mile Plains, Brisbane).

*E. sepulcralis*, almost or quite sessile, ovate-cuneate, emarginate, 2.5 cm. long, 1.5 cm. broad, subglaucous, glabrous (Bremer Bay).

*E. buprestium*, sessile, ovate, 3.5 cm. long, 2.5 cm. broad, light glaucous green, glabrous (Kalgan Plains).

(5) *Subsequent pairs of leaves* (Number, shape, vestiture).

*E. marginata*, six or more, sessile up to the sixth pair, broad lanceolate, ranging from 5 cm. long, 1.5 cm. broad, to 7 cm. long, 2.5 cm. broad, light green, glabrous (near Perth).

*E. Todtiana*, six or more, sessile up to the sixth pair, then shortly petiolate and still opposite at 24 inches, broad to narrow lanceolate, at 11 inches, 12 cm. long, 3.5 cm. broad, light green, glabrous (Peninsula Estate, Maylands, W.A.)

*E. Planchoniana*, six pairs, sessile to fourth pair, then shortly petiolate, oblong-lanceolate, ranging from 5 cm. long, 2.5 cm. broad, to 12 cm. long, 2.5 cm. broad, slightly undulate, light green tinged purple-brown, the midrib a rich purple brown (8-Mile Plains).

*E. sepulcralis*, eight or more, sessile to the sixth pair, then shortly petiolate, oblong to oblong-lanceolate, ranging from 3.5 cm. long, 2 cm. broad, to 8 cm. long, 3.5 cm. broad in the sessile leaves, and 5.5 cm. long, 2 cm. broad, to 8 cm. long, 2.5 cm. broad in the petiolate leaves, all more or less subglaucous, shading to light yellowish green, glabrous (Bremer Bay).

*E. buprestium*, six or more, sessile up to the third pair, then shortly petiolate, broad ovate, emarginate, 5 cm. long, 4 cm. broad in the sessile leaves, and broad-elliptical to broad lanceolate, 7 cm. long, 4.5 cm. broad, to 7.5 cm. long, 2.5 cm. broad, light green, shading to a still lighter green, glabrous (Kalgan Plains).

(6) *Intermediate Leaves.*

*E. marginata*, broad lanceolate, petiolate, 8 cm. long, 5 cm. broad, light green.

*E. Todtiana*, not seen.

*E. Planchoniana*, broad lanceolate, shortly petiolate, 13 cm. long, 4.5 cm. broad, venation fine, distant, intramarginal vein distant from the edge, midrib reddish. Stem terete, reddish (8-Mile Plains). In general appearance it is not unlike *E. Sieberiana*, *E. gigantea*, *E. altior*. In the cotyledons it is allied to *E. miniata* and to *E. ptychocarpa*.

*E. sepulcralis*, oblong lanceolate, shortly petiolate, thickish, 10 cm. long, 4 cm. broad, veins distant, spreading, intramarginal nerve undulate and distant from the edge, light olive green, petiole reddish. Stem terete, purple brown.

*E. buprestium*, not seen.

(6a) (Miss Flockton).

*E. marginata*.

1st leaves ovate or lanceolate, becoming large (3 inches), elliptical sessile and still opposite at 8 inches high (No. 217).

*E. Todtiana*.

1st leaves ovate, very undulate, red midrib,  $3\frac{1}{2}$  inches long,  $1\frac{1}{2}$  inches from the ground line. Height, 8 inches, still opposite.

*E. Planchoniana*.

1st leaves elliptical, undersurface pink, midrib red. 1st alternate leaves up to 5 inches long, undersurface pale green, midrib red (8-Mile Plains). The young foliage is very red.

1st leaves broad-ovate, almost sessile, midrib and underside rich purple red (Stradbroke Island).

*E. buprestium*.

1st leaves broad ovate, undersurface tinted purple, later becoming ovate-retuse, opposite without pedicel (Kalgan Plains.)

*E. sepulcralis*.

1st leaves ovate, sessile when very young.



## SUPPLEMENTARY NOTES.

Rate of Growth.  
 Growth and Age of Trees.  
 Natural Afforestation.  
 Flowering in Dwarf State.  
 Liquids in Tree Trunks.  
 Pendulous Branches.  
 Manna.  
 Kino.  
 Size and Habit.  
 Barks.  
 Timbers (Colours).  
 „ (Inflammability).  
 „ (in general).  
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 Adjustment of Botanical Descriptions.  
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### Rate of Growth.

(See Part XLVIII, pp. 244-8.)

*Growth and Age of Trees* (p. 245).—"I also think there has been much misconception of the facts in the past. I do not think that any of our Eucalypts attain the age that, owing to their great size, many people have assigned to them. I think that an increase of 1 inch in diameter per year is a moderate estimate for the growth of many of these trees, in the conditions and environment in which they grew, and that from a half to 1 inch per annum is not an uncommon growth for many of our forest trees under average favourable conditions.

In Bairnsdale township there is a very fine specimen of *E. tereticornis*, a tall straight tree, with a bole about 5 feet in diameter at 3 feet from the ground, and about 45 feet to the first branch. It stands in an open place all alone. I have known the tree for thirty-eight years, and believe it has increased in diameter more than 24 inches during that time. It shows little sign of decay, but I believe its rate of growth has been less of later years. I look upon its age as 80-100 years. Near Orbost, growing on the rich river flat lands of the Snowy River, there is a splendid specimen of *E. botryoides*. When I saw it first, about thirty years ago, it was about 2 ft. 6 in. in diameter. Now it is fully 5 feet, and about 50 feet in height to the first branch. Again, and this is more definite, some years ago I saw in Stratford, growing in a White-horn hedge around a garden, two fine healthy vigorous Red Gum trees, *E. tereticornis*. I asked the owner of the garden how they came there. He said they came up as seedlings after he planted the hedge, and he let them grow. He had planted the hedge forty years before. I often noticed these trees, but about five years later, owing to the wide-spreading branches spreading too far over the street, the trees had to be removed. They were cut off level with the top of the hedge, at 5 feet from the ground, and at that height one of them was 30 inches in diameter, and the other about 26 inches. That was the growth of these trees in forty-five years. The stems or boles were not very high, probably not more than 10 feet, to where they spread into three or four limbs, with a thick spreading top of dense foliage.

Some years ago, on the road from Glen Wills to Granite Flat, I passed through a very dense forest of young *E. gigantea*, about 12 to 18 inches in diameter, and about 100 feet high. The growth was much too dense for the trees to attain any large size, but I was able to see, here and there, traces of a former forest, in fragments, and outlines of stumps showing in the surface of the ground which indicated that the ground had been occupied, apparently at some rather remote period, by a forest of immense trees. The traces of these trees were faint, but still sufficient to show that there had been a forest of giant trees there at one time, perhaps not so far remote either. One thing struck me as peculiar, that there were no large, or moderately large trees of a later generation (only the large saplings I have mentioned, probably the largest of them not more than 2 feet in diameter). Had the former forest been destroyed by a bush fire so fierce that even the surface of the ground was burned to such an extent as to prevent all growth of vegetation for a number of years? *E. gigantea* is, of all the 'Stringybarks,' the most easily destroyed by fire." (Harry Hopkins, Bairnsdale, Victoria.)

"On page 245 of Part XLVIII you quote Dr. Howitt as saying, with reference to rapid growth, etc. 'At Omeo, in the Government Reserve a number of *E. viminalis* are now (1890) 60 feet high, which in 1863 were only small saplings under 5 feet in height.' These trees were really *E. rubida* (I at first mistook them for *viminalis*). They have increased greatly in size, though not much in height since Howitt described them as above. The short bole has increased to a diameter up to 3 or 4 feet, crowned with a dense wide-spreading head rising to a total height of perhaps 80 or 90 feet, but the trees are past their prime and are dying—in fact some of them have died, or are falling to pieces through decay. On the main road from Omeo to Cassilis, near the Livingstone Creek bridge, there are several fine trees of *E. rubida* with boles 2½ feet to 4 feet in diameter, and 15 to 25 feet long—a very noticeable group some ten or twelve years ago, of fine grown healthy looking trees. These are now (1921) showing signs of old age and decay, and several are apparently dying. As I wrote previously, I think there has in the past been much misconception as to the age of Eucalypts. I doubt if many species live for more than 100 years, and I believe that most of them reach maturity at between 50 and 100 years." (The same, 3-1-22.)

## Natural Afforestation.

(See Part XLVIII, pp. 248-250.)

"I am particularly interested in the remarks quoted from Dr. A. W. Howitt at p. 248. I entirely agree with him. I am acquainted with a great part of the country to which he refers, and my observations lead me to the same conclusions, especially his remarks about 'Annual bush fires' and the rapid increase and expansion of forest growth when fires were restricted. When the white man first occupied this part of the country, the land was described as 'open' forest, and more or less well grassed. Probably in the summer season fires occurred frequently in the dry grass, so that the 'bush' would be burned annually, or semi-annually, keeping the country 'clean' as Dr. Howitt describes. These 'grass' fires (rather than 'bush' fires) would do little or no damage to the grown timber and larger saplings, but would keep in check the immoderate growth of seedlings and destroy other undergrowth and many pests and parasites. When the white settler came along, he feared these fires, which destroyed the herbage and endangered his flocks, and so he took every care to prevent them from starting or from spreading if once started. Thus the seedlings and other undergrowth had a chance to grow and secure possession, until in time what was formerly well-grassed open timber country, became a thicket of saplings or a jungle of useless undergrowth or 'scrub.' When 'bush' fires did occur, as was inevitable, owing to the accumulation of dead and dying material in these scrubs, and the falling debris of leaves, bark, etc., from the larger trees, they raged with great fury, doing great damage to even the largest trees, and seriously injuring or killing outright the younger trees and saplings. These conditions exist to-day, and, because of the infrequency of fires, rather than their frequency, in the forest areas, much damage is done to the timber, and insect pests increase and flourish in the intervals. For some years past I have been saying that it would be beneficial to have all the forest country, as far as practicable, burned annually. This would, I believe, in time restore the 'bush' country to its former clean and open forest character, promote the growth of a more healthy forest and better class of timber, keep down the many injurious insect and vegetable pests, and prevent the recurrence of periodic destructive bush fires." (The same.)

*E. acmenioides* is one of the worst species to sucker, and one of the first to send up a crop of seedlings after ringbarking, and if left alone it forms a dense forest of saplings in a very short time, as the growth is remarkably rapid. (North-eastern New South Wales, W. F. Blakely.)

*E. dealbata* A. Cunn. "A considerable number of seedlings of it were found coming up naturally in the forest where it was planted after the forest had been damaged by a severe forest fire. This is the first and only definite record we have of any natural reproduction of *Eucalyptus* in northern India. In the same forest there is also natural reproduction of *E. globulus* as a result of the fire, but the seedlings are mainly of the species (*E. dealbata*) I am sending." (R. S. Hole, C.I.E., Forest Botanist, Dehra Dun, U.P. India, 11th November, 1922.)

## Flowering in Dwarf State.

(See Part XLIX, p. 273.)

*E. Foelscheana* F.v.M. "Flowering already at the height of 18 inches (as is the case also with *E. cordata* and *E. vernicosa*)." (Original description of species.)

*E. pilularis* Sm. Otford, by the roadside, halfway to Stanwell Park, N.S.W. (W. F. Blakely, November, 1922.)

*E. punctata* DC. On top of big tunnel, half-way between Wondabyne and Woy Woy, N.S.W. (W. F. Blakely and D. W. C. Shiress, November, 1922.)

*E. umbra* R. T. Baker. Same locality and date.

## Liquids in Tree Trunks.

(See Part XLIX, p. 286, and also under Kinos, p. 145, below.)

"This phenomenon was quite common at Longford, near Sale, where I lived many years ago, in *E. Stuartiana* (locally called 'Apple Tree'), and particularly in the largest and soundest (*i.e.*, not over-matured) trees. It was not noticeable in other species thereabout. This liquid tasted and smelt like sour cider. Sometimes in felling one of these trees, when the cut reached near the centre, there would be a report like the crack of a rifle, and then the liquid would gush out in quite a large quantity." (H. Hopkins, Bairnsdale, V., 3rd January, 1922.)

*E. alba* Reinw. "The heartwood contains water, which runs out in fair quantities when the tree is felled." (C. A. Gardner, Kimberleys, North-west Australia.)

*E. Houseana* (W.V.F.) Maiden. "The trunk is frequently swollen at the base, forming a kind of pedestal as in *E. redunca* var. *elata*." (C. A. Gardner, Kimberleys.)

## Pendulous Branches.

(See Part XLIX, p. 288.)

"A species, not mentioned by you, in which this characteristic is conspicuous in parts of this district is *E. polyanthemus*. This is particularly noticeable at Longford, near Sale, at Heyfield, and between Bairnsdale and Bruthen. The late Dr. Howitt once said to me that he thought those trees with the slender pendulous branches and the other less or not at all pendulous character were really two separate varieties, but I do not think they can be separated botanically. In this district *E. macrorrhyncha* is not noticeably pendulous in habit, although I have seen it so occasionally." (H. Hopkins, Bairnsdale, Victoria.)

*E. Campaspe*, *E. microtheca* (Coolabah), and *E. populifolia* (Bimble Box) may be added to the list of species with conspicuously pendulous branches, at least on occasion.

## Manna.

(See Part LXIII, p. 101, of my "Forest Flora of New South Wales," also Part LV, p. 250, of the present work.)

It has been found on the juvenile leaves of *E. eximia*, about half a mile beyond Warrimoo Railway Station, Blue Mountains. (Dr. E. C. Chisholm and W. F. Blakely.)

## Kino.

For a paper on the Western Australian Red Gum (Marri) Kino (*E. calophylla*), giving a method of bleaching it and of rendering its tannin more available for economic purposes, see Circ. No. 8, by H. Salt, Institute of Science and Industry, 1922. See also *E. calophylla* and *E. latifolia*, under "Timbers," p. 161, below.

### Kino.

In the report of the Forest Department of Western Australia for the year ended 30th June, 1924, Mr. S. L. Kessell, the Conservator, has a brief extract at p. 21 on "Marri Kino Investigation," with acknowledgments to Mr. L. W. Phillips, of the Perth Technical School.

He speaks of the natural reservoirs in *E. calophylla* trees being of two distinct types. One consists of perpendicular fissures radiating from the centre of the tree. As much as 10 gallons of liquid kino have been obtained from one series of shakes, but this yield is very exceptional. The kino drawn from such reservoirs is of inferior quality, having low specific gravity. The other type of reservoir is in the form of a cavity between wood and bark, and can generally be relied upon to give a satisfactory yield of pure liquid kino. It also differs from the radial type in that it usually refills in from two to four weeks after tapping, when a further supply of kino may be drawn from it. The presence of these reservoirs may be detected usually by a slight swelling of the trunk.

The cause of these veins was at one time suggested to be due to bacterial infection of undifferentiated tissue immediately below the cambial region. Experiments, however, do not give any definite confirmation to this theory, and for the present it has been superseded by a purely chemical hypothesis. Mr. W. E. Champion favours an explanation based on carbon dioxide poisoning, due either to the exposure of the cambial region to the air by the boring of insects or mechanical damage, or to an accumulation of an excess of carbon dioxide by respiratory processes in microscopic cavities caused by the rupture of delicate cells of the cambial region owing to wind strain.

## Size and Habit.

(The numbers given are the consecutive numbers of the species.)

26. *E. acmenioides* Schauer. Ranging from a small stunted tree of 20 feet to a stately tree up to 100 feet. (Upper Clarence River, W. F. Blakely.)

136. *E. alba* Reinw. "It is never a tall tree, nor is the trunk thick; the branches are usually straggling and not stained with exudations of gum. . . . Thus the tree is always conspicuous, and when the open forest is composed of it, as it is between Townsville (Q.) and the tableland, the effect of the masses of white trunks is very striking." (J. E. Tenison-Woods, *Proc. Linn. Soc., N.S.W.*, vii, 332, 1882-3, as *E. platyphylla*.) "Tree of 40-50 feet; stem diameter to 1½ feet." (W. V. Fitzgerald, Kimberleys, as *E. platyphylla*.)

"A tree of 30 to 40 feet, with an erect trunk and widely spreading branches. Trunk 10 to 25 feet in height, and 16 inches in diameter." (C. A. Gardner, Kimberleys, as *E. alba*).

181. *E. argillacea* W. V. Fitzgerald. "Tree 20-40 feet high, stem diameter of 6-12 inches." (W. V. F.)

151. *E. brachyandra* F.v.M. "A crooked tree of 25-30 feet high; stem diameter to 9 inches." (W. V. Fitzgerald.) "A dwarf tree or large shrub of 10 to 18 feet, of spreading habit and a usually thick and distorted trunk." (C. A. Gardner, Kimberleys.)

120. *E. caesia* Benth. "Grows Mallee style, about 12 feet high." (C. A. Fauntleroy, near Dowerin, W.A.)

3. *E. calycogona* Turcz. Mr. Walter Gill, Conservator of Forests of South Australia, sent me a photo of a tree 25 feet in height, and Mr. Max Koch says that it is a tree of 30 feet at Cowcowing, Western Australia. "Fairly tall plants, reaching 25-30 feet, usually with only one stem." (F. W. Wakefield, Wedderburn, Victoria.)

3. *E. calycogona* Turcz. A Mallee; stems 6-15 feet, branchlets yellow (No. 2110) Mallee, 20-30 feet, with thick stems of 6-10 inches in diameter, and a dense crown of small pendulous leaves. Looks more like *E. gracilis*, but is a Mallee. (No. 2121.) Harrismith, Western Australia (C. A. Gardner).

83. *E. Campaspe* S. le M. Moore. "District Ranger Ferguson says it is sometimes known as 'Salmon Gum,' but it must not be confused with *E. Salmonophloia* F.v.M. A specimen growing on a diorite hill near Coolgardie is a young tree (20 years more or less). It has no trunk, but the limbs appear to grow and spread from the ground much like a very large Mallee. Another tree stands about 40 feet, and its branches spread and droop like a willow. The thickest part of the tree is about 8 inches in diameter, and the limbs spread from the ground." (J.H.M., in *Journ. Roy. Soc., N.S.W.*, li, 447, 1917.) "Known as 'Silver-topped Gimlet,' widely branched and 20 to 30 feet in height, spirally fluted." (C. A. Gardner, Coolgardie.) (But see remark "Wood is not twisted," by District Ranger Ferguson, quoted below at p. 154.)

189. *E. clavigera* A. Cunn. "A tree of 15 to 35 feet, with an erect trunk and rigid spreading branches with dense foliage. Trunk to 18 feet and 20 inches diameter," (C. A. Gardner, Kimberleys.)

*E. Cloeziana* F.v.M. "The aboriginal name is 'Jandour.' The tree as I know it here (Mundubbera, Q.) is 60 to 80 feet high, with the trunk as straight as a gun barrel, and free from limbs for a number of feet up. It is not a common tree here, and is only found in isolated places and always in country that we graziers term unavailable." (H. S. Bloxsome.)

188. *E. confluens* W.V.F. "Tree 30-40 feet high, stem diameter 1-1½ feet." (W.V.F.)

334. *E. conglobata* (R.Br.) Maiden. A Mallee of 10-20 feet with erect or widely branched stems. No. 2103. Branchlets reddish. Harrismith (C. A. Gardner, No. 2114. Stems few, erect and very straight, 10-25 feet high and up to 5 inches in diameter. Grasspatch (C. A. Gardner, No. 2220.)

104. *E. cordata* Hook f. "Usually a small tree, but at Uxbridge, T., in forests, it attains a height of 200 feet." (L. Rodway.)

174. *E. cornuta* Labill. A tall Mallee, stems erect, 8-15 feet diameter 2 inches,, bark smooth, shining, decorticating in strips. (C. A. Gardner, No. 1956.)

205. *E. corymbosa* Sm. "In the Ramornie district, Clarence River, N.S.W., it is a much larger tree than is usually met with in the county of Cumberland; it has a pale, flaky, persistent bark. On the whole it is one of the finest forest trees." (W. F. Blakely.)

351. *E. crucis* Maiden. "A slender Mallee with erect stems attaining a height of 25 feet with numerous side branches seldom exceeding 3 feet in length. The stems range from 4 to 6 inches in diameter." (C. A. Gardner, Yorkrakine.)

217. *E. dichromophloia* F.v.M. "A tree of 20 to 30 feet, with spreading slender branches. Trunk to 15 feet and 10 inches diameter. Easily recognised by its graceful habit." (C. A. Gardner, Kimberleys.)

79. *E. doratoxylon* F.v.M. "A Mallee; stems attaining 18 or 20 feet, slender and erect; stems up to 4 inches diameter." (Mount Toolbrunup, Stirling Range, C. A. Gardner.)

199. *E. dumosa* A. Cunn. Stems 10-20 feet, erect, straight, smooth, 2-4 inches diameter, bark greyish-white, shredding in long strips. Grasspatch (C. A. Gardner, No. 2221.)

252. *E. eremophila* Maiden. A Mallee of 6-15 feet, with erect stems of 2-3 inches. No. 2123. Mallee with slender twisted stems of 4-5 or even 7 feet. No. 2122. Harrismith (C. A. Gardner).

var. *grandiflora* Maiden. Mallee of 10-13 feet, branches erect, buds and fruits pendulous. No. 2120. Harrismith (C. A. Gardner).

117. *E. erythronema* Turcz. "Tree of 25 feet, with a very crooked trunk of 10 feet, diameter 1 foot." (W. V. Fitzgerald.) "Small tree of 20-30 feet." (Max Koch.)

249. *E. Ewartiana* Maiden. "A Mallee, 10 to 18 feet high, with slender branches." (C. A. Gardner, Westonia.)

75. *E. falcata* Turcz. Tree of 20–35 feet, with fairly erect branches, flat-topped. No. 2116 (C. A. Gardner).

5. *E. foecunda* Schauer. A number seen about 18 inches or 2 feet in diameter, Pindar (J.H.M.); "Medium-sized tree, 3–4 feet in diameter, not much of a barrel." Goomalling (Percy Murphy). It grows in clumps from one root.

224. *E. Foelscheana* F.v.M. "Bloodwood. A tree of 10 to 35 feet in height with few widely spreading branches. Trunk to 15 feet and 15 inches diameter." (C. A. Gardner, Kimberleys.)

355. *E. Gardneri* Maiden. "Blue Mallet"; tree of 20–30 feet, erect, narrowly branched. No. 2115. Harrismith (C. A. Gardner).

209. *E. gracilis* F.v.M. "Attains a height of 65 feet, and a diameter of 30 inches." (C. A. Gardner, Coolgardie.)

281. *E. Houseana* (W.V.F.) Maiden. "A tree of 20 to 60 feet with numerous erect or spreading (or even drooping) branches, occasionally attaining a height of 80 feet and a diameter of 32 inches, the largest of any Eucalypt seen in tropical Western Australia." (C. A. Gardner, Kimberleys.)

4. *E. incrassata* Labill. A Mallee, with stems of 6–15 feet, dense and spreading from an exposed stock. No. 1914: 10 miles north of Wagin, Western Australia. Stock quite subterranean, stems numerous, slender, rarely exceeding 2 inches in diameter, branches rigid, erect, the branchlets reddish, but not at all glaucous. No. 1902: Narrogin. Stems erect, rigid from a half-buried stock, 8–12 feet high. No. 2102. Harrismith (C. A. Gardner).

223. *E. latifolia* F.v.M. "An erect tree, with widely spreading branches, which are rather pendulous. Trunk 15 to 25 feet, and up to 20 inches in diameter." (C. A. Gardner, Kimberleys.)

176. *E. Lehmanni* Preiss. A stunted Mallee of 4–6 feet, with several slender stems from an extensive woody stock of 1–3 feet diameter. Warrungup Hill, Stirling Range (C. A. Gardner, No. 1955).

332. *E. leptophylla* F.v.M. "A small spreading tree of 15 to 25 feet, with widely spreading branches, the trunk 6 to 8 feet high and 8 to 12 inches diameter." (C. A. Gardner, Southern Cross.) A Mallee of 3–5 or even 6 feet, with a number of wiry stems from a subterranean stock, branchlets yellow, becoming reddish. No. 2101. Harrismith (C. A. Gardner).

211. *E. longicornis* F.v.M. "Red Morrel." "A tree of 50 to 80 feet and to 2-3 feet diameter, not much branched." (C. A. Gardner, Coolgardie.) Tall Mallee (*sic.*) of 10-25 feet, branchlets red. No. 2107. Harrismith (C. A. Gardner). A Mallee of 8-12 feet, with numerous erect slender stems of 1-2 inches diameter. Bark smooth, light grey-brown, thin, and decorticating in plates. Narrogin (C. A. Gardner, No. 1904).

97. *E. megacarpa* F.v.M. Hitherto only known as a tree, and sometimes as a large tree, Mr. C. A. Gardner has found a remarkable Mallee-like form. "It is a true Mallee of 4-10 feet, the bark smooth, silvery and grey in patches, decorticating in large flakes. The fruits are much larger than I have seen on *trees*, and more flat on the summit, with an expanded rim" (C. A. Gardner). This form occurs on Mt. Toolbrunup, where it is known as "Bullich." It is hoped that a full suite of specimens may be collected, to see if it has specific differences from *E. megacarpa*.

49. *E. microtheca* F.v.M. Note on the appearance of this tree in "north-west" Western Australia (where it is known as "Blackheart"), and where it has a smooth bark as compared with the rough bark of the Kimberley and New South Wales, &c., tree. See C. A. Gardner in *Aust. For. Journ.*, vi, 241 (September, 1923).

339. *E. melanoxydon* Maiden. "Black Morrel." "A tree of 50 to 70 feet and 2 to 2½ feet diameter. (C. A. Gardner, Coolgardie.)

123. *E. miniata* A. Cunn. "Tree of 50-100 feet high; stem diameter about 3 feet." (W. V. Fitzgerald, Kimberleys.) "Woolly-butt." "A tree of 30 to 65 feet, with a stout erect trunk of 20 to 40 feet and 2 feet diameter." (C. A. Gardner, Kimberleys, different route.)

182. *E. occidentalis* Endl. "Swamp of Flat-topped Yate." A tree of 30-50 feet in height, and up to 24 inches diameter. Bark persistent and fibrous, thick and deeply longitudinally fissured on the trunk and bases of the main branches, that of the upper portions of the tree smooth, silver-grey and blotched, decorticating in long thick ribbon-like pieces, which hang around the line of separation of the different types of bark in long persistent ribbons. No. 1911. Wagin Lake (C. A. Gardner).

73. *E. oleosa* F.v.M. Following are reports by Mr. C. A. Gardner on two different trees at Coolgardie-Widgiemooltha, W.A. See Part XL, p. 325, for further particulars of this species—

- (1) "Erect or more usually with a straggling trunk, 20 to 40 feet high, with widely spreading rigid branches. Trunk to 15 feet and 18 inches diameter. (2) Apparently a medium-sized tree with a basal diameter of 16 inches, but no trees seen unfelled."

72. *E. oligantha* Schauer. "Tree to a height of 40 feet; stem diameter to 1 foot. In appearance bears a close resemblance to *Sterculia decipiens*." (W. V. Fitzgerald MSS.)



171. *E. pachyloma* Benth. Mallee of 4–8 feet with numerous erect, wiry stems, with branches dense, erect, and leafy. Stirling Range (C. A. Gardner).

119. *E. pallidifolia* F.v.M. In general appearance it resembles a spreading stunted form of *E. maculosa* R. T. Baker, its average height being about 30 feet. For a photo see R. H. Cambage in *Journ. Roy. Soc., N.S.W.*, Plate LVIII, fig. 1, 1915.

243. *E. perfoliata* R.Br. “A ‘Bloodwood.’ A small straggling tree of 10 to 20 feet, with a short stout trunk and spreading branches.” (C. A. Gardner, Kimberleys). W. V. Fitzgerald, in the same area saw it up to 40 feet in height; stem diameter to 2 feet.

124. *E. phœnicea* F.v.M. “Large tree, 30 feet high, straight trunk and limbs, on granitic hillside. Native name, ‘Weewell.’” (Pine Creek, Northern Territory, C. E. F. Allen, No. 470.) The term “large” is, of course, comparative.

31. *E. Planchoniana* F.v.M. “Yellow Jacket.” “Fairly tall, glaucous trees, 40–80 feet high, with a stem diameter up to 3 feet, moderately straight, but more or less uneven owing to irregular swellings.” (W. F. Blakely and D. W. C. Shiress, Copmanhurst district, N.S.W.) See Part LI.

244. *E. ptychocarpa* F.v.M. “A tree of 30 to 50 feet, with spreading, drooping branches. Trunk 10 to 25 feet in height, and attaining 30 inches in diameter.” (C. A. Gardner, Kimberleys.)

218. *E. pyrophora* Benth. “A tree of 20 to 35 feet, with an erect or leaning trunk and spreading, drooping branches. Trunk to 15 feet and 12 inches in diameter.” (The same.)

50. *E. Raveretiana* F.v.M. “Certainly one of the finest of our tropical Eucalypts—lofty trees. It is truly a noble tree, towering above every other gum-tree on the banks and even in the beds of rivers.” (J. E. Tenison-Woods, *Proc. Linn. Soc., N.S.W.*, vii, 334.)

172. *E. redunca* Schauer. A Mallee of 6–10 feet, with a dull, smooth, greyish bark and slender erect stems. Grasspatch (C. A. Gardner, No. 2219).

168. *E. rostrata* Schlecht. “An erect tree of 40 to 60 feet, with slender, drooping branches.” (C. A. Gardner, Kimberleys.)

179. *E. spathulata* Hook f. 30–40 feet high and 8–10 inches in diameter. Nyabing (F. M. C. Schock). A shrub to a small tree of 20–30 feet, not much branched. Dumbleyung (C. A. Gardner). An erect, virgate Mallee of 4–8 feet, with thin stems and erect slender branches. Harrismith (C. A. Gardner).

216. *E. terminalis* F.v.M. “Does not appear to have a recognised vernacular name, being variously known as Redwood, Ironbark, Red Gum, Bloodwood, &c. 30 to 60 feet with a stout, erect trunk of 20 to 35 feet and 30 inches diameter. It is somewhat difficult to distinguish in the field from *E. pyrophora* Benth.” (C. A. Gardner, Kimberleys.)

158. *E. tereticornis* Sm. "Tall, smooth-barked trees, 40 to 100 feet high, 1-3 feet in diameter, fruits mostly small. (W. F. Blakely and D. W. C. Shiress, Upper Clarence River, N.S.W.)

254. *E. tetradonta* F.v.M. "Messmate" or "Stringybark." "A tree of 20 to 65 feet, but usually about 40 feet high, attaining a diameter of 20 inches." (C. A. Gardner, Kimberleys.)

27. *E. umbra*. Flowering and fruiting less than 6 feet high. (Top of Kariong, north of Hawkesbury River, Blakely and Shiress.)

68. *E. uncinata*. A Mallee, stems numerous, clustered, dense, 8-12 feet high, slender. Bark decorticating in thick brown flakes, leaving the trunk greenish brown, Ten miles north of Wagin (C. A. Gardner, No. 1910). A Mallee of 6-10 feet, with a moderately rough bark, and stems of 2-3 inches diameter. Of spreading habit. Esperance (C. A. Gardner, No. 2212).

175. *E. Websteriana* Maiden. "Mallee habit of growth. Grows to a height of 6-7 feet and stem 2-3 inches diameter at Mount Jackson." (Fitzgerald Fraser, through W. C. Grasby.) "Not very large, more like large shrubs, of a gnarled and stunted appearance. The highest specimen I have seen is under 20 feet, with diameter of trunk about 8 inches." (R. J. Larsen, of Lake Lefroy.)

## Barks.

(See also "Tannin" and "Oil in Bark," Part LII, p. 101. Also under *E. Herbertiana* and *E. Macarthuri*, M. B. Welch, p. 157, below.)

"The development of the periderm keeps pace with the development of the stem. As soon as the wood of the stem becomes thicker, by the intercalation of a new annual ring, the mantle of periderm stretches, and consequently the whole envelope of bark. In many trees this bark remains year after year on the periphery of the stem; it becomes fissured by the continued increase in thickness, but new bark is as continuously produced from within, closing up the fissures. In other instances a part of the bark falls off on the ground in consequence of the thickening of the stem, and is again replaced by new bark from within." (Kerner & Oliver, i, 719.)

Compare Oldfield's remarks quoted at p. 51, Part LI.

"The fall of the leaf may be looked upon, so far, as an excretion of superfluous matter, which, in deciduous plants, occurs only once every year, but is then carried out on a grand scale." (Kerner, i, 486.) This is analogous to the fall of the bark in Eucalyptus, which often falls in enormous quantities, carrying spent materials with it.

"Your chapters dealing with barks are very interesting and instructive, but the differentiation seems a hopeless task. I think soil, as well as climatic conditions, affect and cause variations in the bark in some species at least. I have noticed that, on very poor sandy soils, the outer "rough" bark persists, or is 'thicker' to a much greater extent on otherwise 'smooth' or 'half-barked' species than on the richer soils; particularly have I noticed this in the case of *E. viminalis* and *E. radiata*." (H. Hopkins.)

The colours of the barks of all the smooth-barked trees vary according to the season of the year; so that it would be well for the student of this most interesting branch of dendrology to take into consideration the season or time of the year. To get an accurate description of the bark it would be necessary to describe it soon after it was shed, and again about one or two months after; and a final description a short period before the tree sheds its bark again. Half-barks should be followed up in a similar manner.

Compare the chapter on Barks in Part LI, pp. 19, 20, &c.

173. *E. accedens* W. V. Fitzgerald. "Contains 18 per cent. tans." (H. Salt Circular No. 8, Bureau of Science and Industry, 1922. Further notes from this Circular will be quoted as "H. Salt.>"). The dendrological and silvicultural records in the Circular are by Mr. C. A. Gardner, through S. L. Kessell, Acting Conservator of Forests, Perth, Western Australia. Compare Part LII, p. 101.

26. *E. acmenioides* Schauer. Bark stringy, somewhat furrowed on old trees. Upper Clarence River (W. F. Blakely).

136. *E. alba* Reinw. "Its distinguishing character is the great width of the leaves and the conspicuous cream-coloured smooth bark. Unlike most of the gum trees the bark of which does not split, the deciduous portions soon fall off, so that there are none of those strips and ribbons or dark crests of bark which are so characteristic of the Australian bush. The bark is smooth or slightly wrinkled, and of bright colour." North Queensland (Rev. J. E. Tenison-Woods, *Proc. Linn. Soc., N.S.W.*, vii, 332, as *E. platyphylla*). "Greyish to reddish, thin, decorticating in strips, leaving the trunk and branches smooth and cream-coloured." (W. V. Fitzgerald, Kimberleys, as *E. platyphylla*.)

"Smooth, pinkish or almost white, decorticating in large grey flakes." (C. A. Gardner, Kimberleys, as *E. alba*.)

"Contains from 30 to 32 per cent. tans. This is the Ridge Gum of the Kimberleys, called the River Gum in Java, and the Mountain Gum (*sic.*) in Queensland. It grows to 35 feet, and the bark is about  $\frac{1}{2}$ -inch thick, white outside and pink inside. The tannins present are readily soluble in water, and mostly at a temperature below 50 degrees C. . . . The Department of the North-west is using this bark at the Aborigines' Station at Noola Bulla, 270 miles south of Wyndham, and though the apparatus is primitive, and the labour mostly native labour, they have turned out excellent leather of a good colour and substance. The quantity of bark available can be said to be unlimited, and the stripping is easy. Besides the value of this bark for export, or for extract manufacture, the supply of cheap hides in the Kimberleys offers an opportunity of establishing a tannery in or near the source of the Ridge Gum supplies." (H. Salt.)

"Khaki-coloured bark." (C. E. F. Allen, Katherine River, Northern Territory).

136. *E. alba*. "This tree is readily distinguished in the field by its clean white trunk and branches." (C. T. White, Port Moresby, Papua.)

181. *E. argillacea* W. V. Fitzgerald. "Dark grey, persistent on trunk and branches, similar to that of *E. amygdalina*, 'Peppermint.'" (W. V. Fitzgerald MSS.)

356. *E. astringens* Maiden. "Contains from 40 to 56 per cent. tans, and is commonly known as 'Mallet,' 'Brown Mallet,' or 'Red Mallet.' This tree grows up to 50 feet high, and has a thin bark, which is very easily stripped. It is found in thickets of up to 10 acres. Its natural habitat seems to be the ironstone ridges, but further south the Mallet patches are found on the lower flats. The Mallet bark from the northern portion of the area is darker than that from the south, and this latter often assumes a white or flesh-coloured tint on the outside." (H. Salt.)

247. *E. Baileyana* F.v.M. "Has a trunk similar to Grey Ironbark (*E. paniculata*) when you are at a distance, but when you are close to it it looks like a Stringybark." (Forester Henry A. Timms, Clarence River, N.S.W.)

42. *E. bicolor* A. Cunn. "Box-bark on trunk and branches. About 40 feet high. In Queensland, about 10 miles north of Mungindi, N.S.W." (R. H. Cabbage, No. 4393.) Mr. Cabbage gives the native name as "Cooboroo," which is evidently a variant of the name "Goborro" given by Sir Thomas Mitchell as in use in 1835 by the natives of south-western New South Wales. Attention is also drawn to the "Boxbark" of the Mungindi tree. Mr. Cabbage also has specimens (called by the same name by the blacks), but not so satisfactory, from Bimble Station, 70 miles north of Mungindi (No. 4405).

126. *E. botryoides* Sm. Barks of *E. botryoides* and *E. robusta* are known as Mahogany, originally applied to the timber, which is softer than that of *E. resinifera* and its allies. (See Part LIII, p. 155, under Timbers.) See also *Rhytiphloïæ* (b), with red timbers (Part LI, p. 45, under Barks), where the bark is described, including that of the Gippsland trees.

In my "Forest Flora of New South Wales," Part LXXII, we have the following description of the bark of these trees:—"Dark, rough scaly, and persistent on the stem and main branches, smooth on the smaller branches, outer bark on these peeling off in thin flakes" (top of p. 41). In parts of Gippsland the species would appear to attain its best development, and there to be a half-barked tree (*Hemiphloïæ*). We have thus another instance of the impossibility of marshalling all individuals of a species into recognised groups of barks.

157. *E. brachyandra* F.v.M. "Grey, rough, persistent on trunk and branches." Sunday Island, North-west Australia (W. V. Fitzgerald MSS.). "Fibrous, persistent, fairly rough, the branchlets smooth, of a grey brown colour, decorticating in long strips. The bark of the trunk is of a dark brownish-grey." (C. A. Gardner, Kimberleys.)

120. *E. cæsia* Benth. "Mr. C. A. Fauntleroy, Uberin, Dowerin, W.A., says: 'The bark has a long-grained fibre and runs like Jarrah. It is composed of a number of thin layers or flakes, hardly as thick as a threepenny-piece while green, and when dry are thinner still. The lower wood is shedding a layer now, which splits into narrow strips along the stem and breaks across at short intervals, some pieces curling vertically,

others horizontally, but all curling. The new bark on the lower section is of a rich yellow-brown to orange-brown colour. The mid-section, which will not shed a layer this year, is covered with a blue-grey bloom which rubs off on the hand and exposes bark of a reddish colour. The bark of the young wood and the top of the trees is red without the bloom powder.' Specimens from Mr. Fauntleroy show it to have a smooth, tough bark, which strips in long lengths. The smooth bark has thin reddish-brown flakes, which fall off in succession." (J.H.M., in *Journ. Roy. Soc., N.S.W.*, li, 446, 1917.)

3. *E. calycogona* Turcz. "Smooth, greyish, very similar in colour to that of *E. fruticetorum*." Wedderburn, Victoria (F. W. Wakefield).

Greenish-brown, smooth, with flakes of shedding grey-brown bark. No. 2110. Dark brown, smooth above, but inclined to be flaky-rough at the base. No. 2117. Harrismith, W.A. (C. A. Gardner, March, 1924).

269. *E. Cambageana* Maiden. In Part LI this is classified as a member of the Hemiphloïæ, with a red timber. It would appear from the following note that the rough bark is more or less tessellated. "Rough bark marked into squares halfway up the stem. Blackbutt." (H. I. Jensen.)

83. *E. Campaspe* S. le M. Moore. "Bark much the same as *E. salubris*, but wood is not twisted." (District Ranger Ferguson, near Coolgardie). "Smooth, thin, and brown, decorticating in large flakes. The branchlets are glaucous." (C. A. Gardner, Coolgardie.)

189. *E. clavigera* A. Cunn. "Of the lower portions persistent and flaky, that of the upper deciduous, decorticating in large thin flakes. The height of the persistent bark varies, but is usually from 4 to 6 feet, of a grey colour, while the deciduous portions are of a light greyish-pink colour." (C. A. Gardner, Kimberleys.) Mr. C. T. White speaks of the bark near Port Moresby, Papua, as being "easily distinguished by the blackish tessellated bark at the butt, extending for about 5 to 10 feet up the trunk."

71. *E. Cloeziana* F.v.M. See the description of the bark already given. Mr. H. S. Bloxsome says that the bark at the extremities of the branches becomes smooth, like Gum-topped Box (presumably *E. hemiphloia*).

8. *E. coccifera* Hook. "Small tree, with a smooth white bark." (L. Rodway.)

188. *E. confluens* W. V. Fitzgerald. "White, smooth." (W.V.F.)

334. *E. conglobata* (R.Br.) Maiden. Varying from a light silvery grey to a deep dull greenish-grey. No. 2103. Olive-green or brownish-green, smooth and thin, with small hard patches of deciduous bark adhering near the base. No. 2114. Harrismith, W.A. (C. A. Gardner). Silvery-white, decorticating in tough, stringy, ribbon-like strips along the entire length of the stem, the new bark persistently smooth. Grasspatch (C. A. Gardner, No. 2220).

351. *E. crucis* Maiden. "Identical with that of *E. Ewartiana*." (C. A. Gardner, Yorkrakine.) See Part L, p. 330.

165. *E. dealbata* A. Cunn. Forest Guard E. O. Allen, of Grenfell, N.S.W., reports this species as "Blue Gum" or "Swamp Gum" at the Weddin State Forest. It has a height of 40 feet, a girth of 6 feet, with spreading branches, and has "smooth, light blue bark." (Latin: *dealbata*, whitewashed.)

217. *E. dichromophloia* F.v.M. "Persistent throughout, but of a loose flaky nature, roughish grey." (C. A. Gardner, Kimberleys.)

108. *E. diversicolor* F.v.M. "Contains from 16 to 20 per cent. tans. The bark is  $\frac{3}{4}$ -inch thick. The leather made from the bark extract is a pale cream in colour, darkening to a pale brown on exposure to sunlight, but the final colour is still good." (H. Salt.)

79. *E. doratoxylon*. "Smooth and brown, but dull-coloured and thin, decorticating in long strips, leaving a smooth stem." (Mount Toolbrunup, Stirling Range, C. A. Gardner.)

252. *E. eremophila* Maiden. Greenish-grey, dull. No. 2123. Smooth, pinkish-red, thin. No. 2118. Greyish, No. 2122. (Harrissmith, C. A. Gardner.)

Var. *grandiflora*. Smooth, reddish-brown. No. 2120. (C. A. Gardner.)

253. *E. erythrocorys*. "A tree about 30 feet, with a pure white bark when a few years old." (H. Steedman.)

117. *E. erythronema* Turcz. "Greyish to white, smooth." (W. V. Fitzgerald.) "Very light grey, smooth." (Max Koch.) "White Mallee, contains 30 per cent. tans. This tree, which has the general Mallee form, grows from 10 to 15 feet high, and bears a thin bark. It is found in areas where *E. salmonophloia* and *E. salubris* are common, and is commonest in the Avon district, where it grows in thickets. The extract from this bark is pale in colour, and gives a pale-colored leather, a property which appears to be common to Mallee barks generally." (H. Salt.)

249. *E. Ewartiana* Maiden. "Green, with red patches of decorticating bark, giving the tree an elegant striated appearance." (C. A. Gardner, Westonia.) See p. 330, Part L.

75. *E. falcata* Turcz. "Known as White or Silver Mallet, and contains from 5 to 32 per cent. tans. Growing up to 40 feet high, with a thin bark, often containing kino. It is scattered in Mallet patches, and is not plentiful but is stripped and sold as 'Mallet.'" (H. Salt.) Perfectly smooth, whitish, red in fracture. Harrissmith (C. A. Gardner.)

5. *E. fecunda* Schauer. "Butt has a rough persistent bark. Branches smooth, York Gum." (Max Koch.) "Of a stringy nature near the base, but of a smooth, greenish colour higher up." (Anon.) "Black flaky to almost ribbony bark on trunk, smooth limbs." (J.H.M., Pindar.) "York Gum has a rough bark up to the branches, and is generally with large spreading limbs, with short trunks. It does not seem to be a tree yielding much timber. Bark flaky-fibrous, thin." (Percy Murphy, Goomalling.)

"Contains from 5 to 10 per cent. tans. Although this bark has not a high tannin content, it is very plentiful over a wide range. The tree grows from 40 to 60 feet high, and the bark is  $\frac{1}{2}$ -inch thick." (H. Salt.)

224. *E. Foelshceana* F.v.M. "Of a light buff colour, or whiter, with purple blotches of decorticating bark, otherwise quite smooth." (C. A. Gardner, Kimberleys.)

355. *E. Gardneri* Maiden. Beginning (March, 1924) to shed in small crisped flakes, the under pinkish brown. No. 2115. Harrismith (C. A. Gardner.)

209. *E. gracilis* F.v.M. "The fibrous persistent bark extends upwards over the greater portion of the trunk, ending in a collar-like fringe of ribbony bark. The upper portion of the trunk and branches have a smooth greenish-brown bark." (C. A. Gardner, Coolgardie, W.A.) In sending further specimens from the same locality under the name "Black Morrel," he speaks of the "bark of the lower trunk thick, fibrous, and persistent, with a fibrous brown outer layer and a dense yellowish-brown inner layer." Locally known as a Blackbutt. Tree of 20-45 feet, typically a Morrel, but the rough bark covering only the lower half of the trunk. No. 2119. Harrismith. W.A. (C. A. Gardner.)

344. *E. Herbertiana* Maiden. "The tree has a resinous scent." (C. A. Gardner, Kimberleys.) Perhaps this is a consequence of "Oil in Bark." Compare Part LII, p. 101.

281. *E. Houseana* (W.V.F.) Maiden. "Quite white, smooth, decorticating in large thin flakes." (C. A. Gardner, Kimberleys.)

4. *E. incrassata* Labill. Greyish-brown, deciduous in large greyish plates. No. 1914. Thin, smooth, pale-brown, becoming greyish and decorticating in large flakes. No. 1902. Greenish-brown, smooth, decorticating in rigid brown strips, branchlets reddish. No. 2102. Harrismith (C. A. Gardner.)

223. *E. latifolia* F.v.M. "Of a yellowish-pink colour, spotted with purple-grey flakes, which give the trunk a mottled appearance . . . has an almost smooth bark and would doubtless be a Bloodwood." (C. A. Gardner, Kimberleys.)

332. *E. leptophylla* F.v.M. Thin, reddish, decorticating in rather thick grey-brown plates or strips. No. 2102. Harrismith (C. A. Gardner.)

211. *E. longicornis* F.v.M. "Of the trunk persistent and fibrous-flaky, more or less fissured in the adult tree, light grey in colour. In fracture the bark has an outer brown layer, and the inner bark is a pink or red colour. That of the branches is smooth, greenish-brown or brown, with grey streaks." (C. A. Gardner, Coolgardie.) Thin greenish-brown bark, ultimately decorticating to a pale olive-green or brownish bark. No. 2107. Harrismith (C. A. Gardner).

133. *E. Macarthuri* Deane and Maiden. "The occurrence of oil-glands in the barks of certain Eucalypts," by M. B. Welch, *Proc. Linn. Soc., N.S.W.*, xlvii, 428-438 with two plates of the anatomy of the barks of *E. Macarthuri* and *E. Smithii* (1922). The author states that a large number of species have been examined with negative results, and that it is evident that Eucalypts with bark oil-glands are the exception rather than the rule. Those species in which oil-glands occur are noted in detail, and there is a useful summary at p. 437.

53. *E. melanophloia* F.v.M. "Another peculiarity about it is that the rough deeply furrowed black bark extends to the very small branches. Now, in most Eucalypts the bark, however rough on the stem, becomes smooth on the smaller branches, but it is not so here. The bark is always rough and always black and coarse-looking." (J. E. Tenison-Woods, writing of Queensland, *Proc. Linn. Soc., N.S.W.*, vii, 335.)

339. *E. melanoxydon* Maiden (Black Morrel). "Persistent for the greater part of the trunk, usually extending to the lowest branches, thick and flaky, dark grey in colour and not much furrowed. In fracture the bark has two well-defined layers, an outer thick brown layer, and a very distinct inner bright yellow layer, which is much more pronounced in the fresh bark than in the dry. The bark of the branches and upper trunk is a silvery brown and the bark is ribbony at the line of demarcation between the two classes of bark. The adult trees have, as a rule, a darker persistent bark than the Red Morrel (*E. longicornis*), but the younger trees may be detected by the silvery-brown appearance of the smooth portions. From *E. gracilis* its absence of any green colour in the smooth portions makes it distinct to the bushman." (C. A. Gardner.)

25. *E. microcorys* F.v.M. "Usually large trees, sometimes with a short thick bole and large spreading branches. Bark fibrous throughout, of an inferior stringybark nature, and of a dirty reddish-brown colour, rough to the small branches." (W. F. Blakely and D. W. C. Shiress, Upper Clarence River.)

123. *E. miniata* A. Cunn. "Woolly-fibrous, greyish to reddish, rough and persistent on the lower half of the stem, sometimes covering the whole of it; branches always white and smooth." (W. V. Fitzgerald, Kimberleys.) "Of the trunk persistent, consisting of several papery layers in the young trees, becoming thicker and loosely fibrous with age, the fibres short, brittle and wavy. Higher up the tree the bark is flaky and papery, of a yellowish-white or grey colour (that of the lower trunk is brown). Branches smooth, of a yellowish-white colour, decorticating in large thin flakes." (C. A. Gardner, Kimberleys.)



182. *E. occidentalis* Endl. With reference to my remark at Part XXXVI, p. 146, as to *E. accedens* and *E. occidentalis* having a similar percentage (45) of tannin, Mr. W. V. Fitzgerald writes: "I personally obtained samples of bark from trees of both species which were growing together and they were tested for the information of the Royal Commission on Forestry, of which I was a member at that time, and I do not think the analyst made a mistake."

"Known as 'Swamp Yate' or 'Black Mallet,' and contains from 20 to 26 per cent. tans. This tree grows to 50 feet high, carrying a bark of about  $\frac{1}{3}$ -inch thickness. It is found in clumps in swamps and other low-lying places in the south." (H. Salt.)

73. *E. oleosa* F.v.M. "For a height of 8 to 12 feet persistent, close, light grey, more tessellated than in the other Morrels, and never very thick. Bark of the upper portions smooth, and a light rich-brown in colour streaked with grey, decorticating in long fibrous strips which adhere at their base, where a collar of ribbony bark marks the junction of the two kinds of bark. The bark of the trunk in fracture has an outer light brown layer and a light yellowish inner layer, which, however, is never an intense yellow like that of Nos. 1753-1764 (*E. melanoxydon*)." (C. A. Gardner, Coolgardie-Widgiemooltha.)

72. *E. oligantha* Schauer. "Greyish, thin, smooth." (W. V. Fitzgerald MSS.)

171. *E. pachyloma* Benth. Dull brown, blotched with grey, but smooth. Stirling Range (C. A. Gardner).

192. *E. papuana*. White-barked Gum, in high ground. Cloncurry, North Queensland (Capt. S. A. White, No. 228).

138. *E. Perriniana* F.v.M. "Generally deciduous, sometimes persistent close to ground. Colour a brownish-green, very like the clean bark of the Black Sally (*E. stellulata*), sometimes a faint red tinge is present, more like *E. rubida*. At a glance the trunk could be mistaken for *E. stellulata*. Never white-barked like Snow Gum (*E. coriacea*)." Lobb's Hole, Kiandra district, N.S.W. (W. A. W. de Beuzeville.)

243. *E. perfoliata* R.Br. "Persistent, fibrous, brownish-grey and rough." (C. A. Gardner, Kimberleys.)

1. *E. pilularis* Sm. "Tall half-barked trees 50 to over 100 feet high, usually straight and well proportioned. Bark on the lower portion of the trunk peppermint-like, upper portion and large branches smooth, greenish-white, or very pale-green splashed with streaks of white, on some trees the white predominating; on the smaller branches usually decorticating in long narrow strips, and semi-persistent in the forks of the branches where it often accumulates in large quantities. On very old trees the bark is persistent for a short distance below the forks, somewhat similar to the base, but more of a flaky nature." (W. F. Blakely and D. W. C. Shiress, Upper Clarence River, N.S.W., August, 1922.)

31. *E. Planchoniana* F.v.M. "Close and fibrous throughout, with a peppermint-like cast. Some trees, however, are not unlike *E. acmenioides* and *E. microcorys*, but the general appearance gives one the impression of being stained with a dirty yellow-clay colour, probably due to the weathering of the outer layer, or to the kino." (W. F. Blakely and D. W. C. Shiress, Copmanhurst district.)

178. *E. platypus* Hook. "Contains 25 per cent. tans, and is known as 'Round-leaf Moort.' *E. platypus* grows 25 feet high, and bears a thin bark. It is found in very dense thickets up to 30 acres, and the range is small, stretching from Gnowangerup eastwards, the eastern boundary not being known. The leather made from this material is the lightest in shade of all the samples tanned." (H. Salt.)

244. *E. ptychocarpa* F.v.M. "Persistent on trunk and branches, dark-coloured, fairly rough, soft and flaky." (W. V. Fitzgerald, Kimberleys.) "Persistent throughout, thick and longitudinally fissured, dark grey. Base of trunk usually black, probably the result of bush-fires." (C. A. Gardner, Kimberleys.)

218. *E. pyrophora* Benth. "Persistent and rough, grey." (C. A. Gardner, Kimberleys.)

132. *E. quadrangulata* Deane and Maiden. "Whitish, woolly, not unlike that of our interior White Box in texture. Locally known as 'Scrub Box.'" (Forest Overseer Mattson, referring to Nundle trees.)

172. *E. redunca* Schauer. Brown-grey, decorticating in thin, plate-like strips, the new bark yellow-grey. Harrismith (C. A. Gardner).

Var. *elata* Benth. "Commonly called Wandoo, and contains from 16 to 20 per cent. tans. It grows to 60 feet high, and carries a bark of  $\frac{3}{4}$ -inch thickness. Stripping is difficult, but the bark is thick enough to be knocked off in large pieces when struck sharply. The extract from this bark is of a deep orange colour." (H. Salt.)

168. *E. rostrata* Schlecht. "Smooth white bark." (C. E. F. Allen, Daly Waters and Powell's Creek.) "Thick, silvery white, yellow in fracture, quite smooth." (C. A. Gardner, Kimberleys.) "Containing 16 per cent. tans. About  $\frac{3}{4}$ -inch thick." (H. Salt.)

89. *E. salmonophloia* F.v.M. "Contains from 8 to 13 per cent. tans. The bark is thick, and often has a salmon-pink shade. The wood is of no value for tanning." (H. Salt.)

184. *E. salubris* F.v.M. "Contains from 16 to 19 per cent. tans. Bears a thin kino-impregnated bark, brown outside and easily stripped. It gives a full leather of good colour, although penetration is slow. It has been used in local industry where Wattle and Mallet barks have been used, and was found to give an improved colour, with less darkening on exposure. The chief objection to its use was that it gave ropy liquors, a difficulty that might be overcome." (H. Salt.)

196. *E. setosa* Schauer. "Thick, light, from an old stunted tree." (C. E. F. Allen, No. 676). North of Alice Springs, Northern Territory.

55. *E. Smithii* R. T. Baker. See under *E. Macarthuri*.

179. *E. spathulata* Hook. f. Rough dark butt, branches clean and erect. Nyabing, W.A. (F. M. C. Schock). Smooth, thin, brown and shining, much like that of *E. salubris*. A young tree has a silvery-grey bark. Dumblebung (C. A. Gardner). Light red, brownish or yellowish red, or a warm brown, with a few silver patches of decorticated bark. Harrismith (C. A. Gardner). "Contains 26 per cent. tans, commonly known as 'Swamp Mallet,' grows from 20 to 30 feet high. It bears a thin bark, resembling Mallet, and strips easily. It is not very common." (H. Salt.)

158. *E. tereticornis* Sm. "Varies from very smooth to rough and flaky. Some trees show a decided persistent flaky bark at the base, while others are flaky to the first branch. When smooth it is marked with neutral colours of pale green, glaucous and white, which blend imperceptibly into each other." (W. F. Blakely and D. W. C. Shiress, Upper Clarence River.)

216. *E. terminalis*. F.v.M. "Persistent throughout, rough and of a greyish colour, short in fibre, fairly dense. Used by the natives for shelters, and very durable." (C. A. Gardner, Kimberleys.)

254. *E. tetradonta* F.v.M. "Bark grey, fairly rough, persistent, very stringy." (The same.)

200. *E. torquata* Lueh. "Contains 17 per cent. tans, is the so-called 'Gold-fields Flowering Gum,' grows 15 to 20 feet high, and bears a bark  $\frac{1}{2}$ -inch thick, which is somewhat difficult to strip. It is found scattered throughout the gold-fields in small clumps. The tannin present penetrates hide fairly rapidly, giving a soft, tough leather." (H. Salt.)

210. *E. transcontinentalis* Maiden. "Locally known as a bastard Morrel on account of its bark, which is fibrous on the lower trunk to a height of 6 to 10 feet. The bark is, however, not a true Morrel bark since it is not fissured, but almost smooth externally." (C. A. Gardner, Westonia, W.A.)

100. *E. urnigera* Hook. "Smooth and usually blotched with red or brown." (L. Rodway.)

249. *E. Websteriana* Maiden. Thin and tough, and very like that of *E. Ewartiana* (see Part L, p. 330) in general appearance. *E. crucis* has a similar bark, making three peculiar ones, which closely resemble each other.

It would be desirable to describe anomalous barks such as these (and indeed most barks, especially Gums) at various seasons.

## TANS (BARKS AND WOODS).

For analyses of the tannins contained in a number of Western Australian species, see Rep. Forests Department, W.A., year ended 30th June, 1923, p. 54.

**Timbers.***Timber (Colours).*

(See Part LIII, p. 136.)

"I think the colour of the wood is affected slightly by the age of the tree, and to a lesser extent by the nature of the soil on which it grows; to a somewhat larger extent by 'seasoning' after being cut, and to a still larger extent by time and exposure to the air after being seasoned." (Harry Hopkins, Bairnsdale, Victoria.)

*Timbers (Inflammability).*

See Part LIV, p. 209. Compare also the notes referring to Bush Fires at Part XLVIII, p. 248, and p. of the present Part.)

"*E. gigantea* is, of all the Stringybarks, the most easily destroyed by fire." (Harry Hopkins, Gippsland.) (See also notes below under *E. alba*, *E. corymbosa*.)

For analysis of the ash of the bark and wood of *E. Stricklandi*, *E. Le Souefi*, *E. salmonophloia*, and *E. gomphocephala*, see Report, Forests Department, W.A., year ended 30th June, 1923, p. 52.

*Timbers (in general).*

136. *E. alba* Reinw. "Very inferior, and not much used, even for burning." (J. E. Tenison-Woods, *Proc. Linn. Soc., N.S.W.*, vii, 332, as *E. platyphylla*.) "Pale rather soft and very brittle." (W. V. Fitzgerald, Kimberleys.) "Fairly dense, yellowish." (C. A. Gardner, Kimberleys.)

181. *E. argillacea* W. V. Fitzgerald. "Reddish, tough." (W. V. Fitzgerald.)

157. *E. brachyandra* F.v.M. "Red, hard and tough." (W. V. Fitzgerald, Kimberleys.) "Red, dense." (C. A. Gardner, Kimberleys.)

83. *E. Campaspe* S. le M. Moore. "Like Salmon Gum (*E. salmonophloia*)." (District Forester Ferguson.)

71. *E. Cloeziana* F.v.M. "*E. Cloeziana* is good for fencing. I used some here twenty years ago, and it is sound to-day, just as good as any Ironbark that I ever used. A blackfellow told me some time ago that this timber is what the blacks always used in years gone by for their nulla-nullas, in preference to any other. This I can quite understand, as it is a most durable timber. When travelling to Gayndah (55 miles from here) I met a team going to a sawmill with a huge log of *E. Cloeziana*." (H. S. Bloxsome, Delubra, Mundubbera, Queensland, October, 1922.)

188. *E. confluens* (W.V.F.) Maiden. "Brownish, tough and hard." (W. V. Fitzgerald.)

334. *E. conglobata* (R.Br.) Maiden. Pale brown, hard and dense. Grasspatch (C. A. Gardner, No. 2220.)

205. *E. corymbosa* Sm. "Has a good reputation as being one of the best timbers for fencing purposes, since it is not attacked by white ants, and it is also more fire-resistant than any other timber in the Upper Clarence district, N.S.W." (W. F. Blakely.)

69. *E. decipiens* Endl. Mr. Bernard R. Lucas, 1921, sent me the reddest wood I have ever seen in the species from Rosamel, 13 miles from Bunbury, W.A.

14. *E. dives* Schauer. "Broad-leaved Peppermint." "Not used for mill timber to any great extent, as it grows somewhat stunted up to about 5 feet in girth and 50 feet high. Is considered a good fencing timber, lasting well in and out of the ground." (T. H. Williams, Queanbeyan district, N.S.W., on the range towards the coast, at an elevation of about 3,000 feet.)

79. *E. doratoxylon* F.v.M. "Timber pale and strong." Mount Toolbrunup, Stirling Range (C. A. Gardner).

117. *E. erythronema* Turcz. "Reddish, rather brittle." (W. V. Fitzgerald.)

5. *E. fœcunda* Schauer. "Dark brown, hard, used for wheelwright's work—naves, felloes, spokes." (Percy Murphy, Goomalling.)

224. *E. Foelscheana* F.v.M. "Red, and the tree exudes quantities of an extremely astringent deep red gum which dries in large lumps." (C. A. Gardner, Kimberleys.)

160. *E. gigantea* Hook. "On page 252, Part XLVIII, there is a reference to *E. gigantea* at Buddong, as follows:—'A noteworthy feature is that trees evidently well past maturity are sound to the heart and absolutely free from disease.' This quite bears out my observations in connection with the Victorian tree, which is *very rarely* pipy or hollow. I have seen logs of well matured trees felled for milling,  $3\frac{1}{2}$  and 4 feet in diameter, absolutely sound at heart, and this seemed to be characteristic of this timber generally. Not only was there an absence of any sign of pipe, but the wood was thoroughly sound and useable right through the heart. This soundness of heartwood in a Eucalypt was so remarkable as to arrest attention." (Harry Hopkins, Bairnsdale, Victoria.)

101. *E. goniocalyx* F.v.M. Sold as "Yellow Box" and "Mountain Box," Tantawanglo Mountain, Cathcart, N.S.W. (W. A. W. de Beuzeville).

209. *E. gracilis* F.v.M. "Timber dark brown, exceedingly dense and strong." (C. A. Gardner, Coolgardie.) Dark, dense. No. 2119. Harrismith, W.A. (C. A. Gardner).

109. *E. Guilfoylei* Maiden, "Yellow Tingle Tingle." For an account of the properties and estimate of the value of this timber, see Rep. Forests Department, W.A., 30th June, 1923, p. 6. Engineering tests at p. 53.

281. *E. Houseana* (W.V.F.) Maiden. "Timber pinkish, dense and hard, with a pale sapwood. It is not readily attacked by termites." (C. A. Gardner, Kimberleys).

251 *E. Jacksoni* Maiden, "Red Tingle Tingle." For an account of the properties and estimate of the value of this timber, see Rep. Forests Department, W.A., year ended 30th June, 1923, p. 6. Engineering tests at p. 53.

223. *E. latifolia* F.v.M. "Pale red in colour. It exudes a large quantity of kino." (C. A. Gardner, Kimberleys.)

211. *E. longicornis* F.v.M. "Dense and red in colour." (C. A. Gardner, Coolgardie.)

339. *E. melanoxydon* Maiden. "Cigar-brown or a darker brown, hard, strong and dense." (C. A. Gardner.)

123. *E. miniata* A. Cunn. "Red, tough and hard." (W. V. Fitzgerald.)

73. *E. oleosa* F.v.M. "Deep red and very hard." (C. A. Gardner, Coolgardie-Widgiemooltha.)

72. *E. oligantha* Schauer. "Reddish brown, tough and hard." (W. V. Fitzgerald MSS.)

192. *E. papuana* F.v.M. With reference to page 194, Part XXXVII, Mr. W. V. Fitzgerald writes: "The timber of the trees referred by me to *E. tessellaris* is pale and brittle, and was generally regarded in West Kimberley as of inferior quality."

243. *E. perfoliata* R.Br. "Red, fairly dense." (C. A. Gardner, Kimberleys.)

124. *E. phænicea* F.v.M. "Reddish-brown." (C. E. F. Allen, No. 470, Pine Creek, Northern Territory.)

62. *E. polyanthemus* Schauer. "The forests of this tree are unfortunately not very extensive, but the wood is of excellent quality, suitable for posts, sleepers, piles, beams, &c. It is very durable in the ground, being almost, if not quite, equal to Red Gum (*E. tereticornis*) in this respect. I have seen fence posts of this timber, after being

in use thirty-two years, that were quite sound, and equally as good as Red Gum posts in other parts of the same fence. It is next to Red Gum in my opinion, and I am sorry it is so scarce and so rapidly being destroyed—scarcely any of this species is being renewed. In the higher and poorer country along the Tambo Valley and in East Gippsland, the timber of *E. polyanthemos* is not quite so good, the trees do not grow so straight or to a large size, and there is much heart decay, even the saplings of less than a foot being usually hollow. On the richer lowlands the timber is usually very sound.” (Harry Hopkins, Bairnsdale, Victoria.)

244. *E. ptychocarpa* F.v.M. “Red and porous.” (W. V. Fitzgerald, Kimberleys.) “Pink, fairly soft.” (C. A. Gardner, Kimberleys.) Evidently it is inferior to most of the *Corymbosæ*.

132. *E. quadrangulata* Deane and Maiden. “Much esteemed by sawmillers, and reminds one of those of *E. goniocalyx* (Mountain Gum), *E. microcorys* (Tallow Wood), and *E. maculata* (Spotted Gum).” (Forest Overseer Matterson, speaking of Nundle, N.S.W., trees.)

50. *E. Raveretiana* F.v.M. “It goes by the local names of Grey Gum, Iron Gum, and Woollybutt, and is highly esteemed as a timber tree. It was much valued for sleepers on the Central Railway, Queensland, but the plate-layers told me it was so hard that it destroyed their tools. The wood is dark brown and takes a beautiful polish, besides being close-grained without any interstices filled with gum.” (J. E. Tenison-Woods in *Proc. Linn. Soc., N.S.W.*, vii, 335.)

196. *E. setosa*. “Light-coloured sap-wood, dark red heart-wood.” (C. E. F. Allen, No. 676, north of Alice Springs.)

179. *E. spathulata* Hook. f. Light-brown, hard and dense. Dumbleyung (C. A. Gardner).

216. *E. terminalis* F.v.M. “Dense, of a deep red colour, but fairly soft, with resin ducts. The tree exudes small quantities of a deep red kino, which is very astringent.” (C. A. Gardner, Kimberleys.)

254. *E. tetradonta* F.v.M. “Pale red, moderately hard, with a yellow sapwood.” (The same.)

230. *E. Watsoniana* F.v.M. Pale-brown, coarse-grained, somewhat fissile, liable to gum-veins.

175. *E. Websteriana* Maiden. “Very hard, deep brown with white towards the bark. Some specimens seen by me are all more or less hollow, evidently eaten by termites. The wood is good firewood; but not of much quality.” (R. J. Larsen, Lake Lefroy.)

Welch, M. B. "Note on the Structure of some Eucalyptus Woods," *Journ. Roy. Soc., N.S.W.*, lviii, 169 (1924). Deals with the anatomy of the woods of *E. pilularis* Sm., *E. microcorys* F.v.M., and *E. maculata* Hook. The paper concludes with a table of comparative characters.

### Leaves (and Oils).

*E. incrassata* Labill. Dull but thick, erect and glaucous. No. 1902. Thick, erect, dull green, but shining, with thick reddish margins, the veins not very conspicuous, minutely oil-dotted. Harrismith, W.A. (C. A. Gardner).

*E. leptophylla* F.v.M. Narrow, bright green and copiously oil-dotted. Juvenile leaves narrow, oblong-spathulate, equally glaucous on both sides. No. 2101. Harrismith (C. A. Gardner).

*E. Perriniana* F.v.M. Foliage very glaucous and perfoliate to within about 6 inches of terminal branchlets. Lobb's Hole, Kiandra district, N.S.W. (W. A. W. de Beuzeville).

*E. redunca* Schauer. Glaucous, small, erect and rigid. Harrismith (C. A. Gardner).

*E. redunca* var. *elata*. "Wandoo." The younger leaves distinctly red in colour, the secondary ones assuming a glaucous hue. Narrogin, W.A. (C. A. Gardner).

Penfold, A. R., and Morrison, F. R. "Notes on *Eucalyptus piperita* and its Essential Oils, with special reference to their Piperitone content," Part I, *Journ. Roy. Soc., N.S.W.*, lviii, 124 (1924). The authors draw attention to the difference of the oils from trees in the Port Jackson and other districts. They give a note on the separation of Phellandrene and Piperitone.

### Inflorescence.

(This includes Operculum, Part LVIII, p. 475; Pedicel, p. 444; Calyx-tube, p. 468; Filament, Part LIX, p. 547; and Anther, p. 537.)

137. *E. alba* Reinw. (*platyphylla*). Operculum double (*E. bigalerita* F.v.M.). (W. V. Fitzgerald, Kimberleys.)

181. *E. argillacea* W. V. Fitzgerald. "Flowers small."

120. *E. cæsia* Benth. Buds elongated pear-shaped, 2-3 cm. long, the tapering calyx-tube about 1.5 cm., with the bluntly conoid operculum about 1 cm. long. Four and five in an umbel.



8. *E. coccifera* Hook. f. Buds club-shaped, with small, nearly flat, opercula; normally only three in the umbel. (Rodway.)

334. *E. conglobata* (R.Br.) Maiden. Filaments white. No. 2103. Flowers yellowish-white. No. 2114. Harrismith (C. A. Gardner).

104. *E. cordata* Labill. Flowers three together on short stalks, close in the angles of the leaves; tube broad, operculum almost flat. (Rodway.)

174. *E. cornuta* Labill. Filaments greenish yellow, calyces separate (fruits not seen). Warrungup Hill, Stirling Range (C. A. Gardner).

351. *E. crucis* Maiden. A very glaucous bud, lemon-yellow filaments and similar anthers, but I cannot recognise the small gland at the top of the filament. Yorkrakine (C. A. Gardner).

79. *E. doratoxylon* F.v.M. "Buds green with white opercula." Mount Tool-brunup, Stirling Range (C. A. Gardner).

199. *E. dumosa* A. Cunn. Filaments white. Grasspatch, W.A. (C. A. Gardner, No. 2221).

117. *E. erythronema* Turcz. Flowers reported as "sweet scented." When fully ripe, operculum of slightly greater diameter than the calyx-tube. See Part XXII, p. 23. Cultivated at Deniliquin, N.S.W. (J. S. Parry).

235. *E. ficifolia* F.v.M. I have seen in a garden at Albany, W.A., a clump of four trees about 20 feet high and each one a different shade of red, ranging from faint pink to richest scarlet. The trees I was told were obtained as seedlings from Denmark district. One of these trees had two distinct tints showing on the flowers. (Dr. L. C. Webster, 25th November, 1920.)

5. *E. fœcunda* Schauer. The York Gum. It blooms more or less every year. It carries its buds from ten to twelve months and blooms from August to November, the best blossoming time being in September and October. The blossom is insignificant in appearance. (Correspondent, *Western Mail*, March, 1914.)

281. *E. Houseana* (W.V.F.) Maiden. Peduncles axillary, short, slightly flattened, expanded at the top to receive a sessile cluster of five to seven flowers. Calyx-tube broadly turbinate or almost hemispherical, slightly angular and glaucous. Operculum hemispherical, not quite so long as the calyx-tube. Filaments white, anthers pale yellow. (C. A. Gardner, Kimberleys.)

4. *E. incrassata* Labill. Filaments yellowish-white. No. 1914. White, anthers pale-coloured, the flowers rather sweetly scented. No. 1902. Buds yellowish-green, more or less angled or ribbed, the operculum abruptly narrowed into a short beak, filaments yellowish-white. No. 2102. Harrismith (C. A. Gardner).

176. *E. Lehmanni* Preiss. Fruits small, conrescent, filaments greenish yellow (flowers and fruits both seen). Warrungup Hill, Stirling Range (C. A. Gardner).

332. *E. leptophylla* F.v.M. Filaments white. No. 2101. Harrismith (C. A. Gardner).

211. *E. longicornis* F.v.M. Filaments yellowish white. No. 2107. Harrismith (C. A. Gardner).

123. *E. miniata* A. Cunn. Inflorescence glaucous. (W. V. Fitzgerald.)

243. *E. perfoliata* R.Br. Opercula red (C. A. Gardner).

94. *E. pyriformis* Turcz. var. *elongata*. C. E. Chapman, Mullewa, Western Australia, sends specimens with peduncles 10 cm. long, terete, and pedicels 4 cm. long slightly quadrangular.

218. *E. pyrophora* Benth. Flowers in terminal corymbs of 4 to 6 inches in diameter. Peduncles and pedicels rough and glaucous. Pedicels slightly flattened, bearing each an umbel of 3 to 7 flowers. Pedicels about 3 lines long, tapering into the calyx; calyx-tube about 4 lines long, turbinate, contracted at the summit; operculum depressed-conical, the line of demarcation with the calyx-tube not visible when in the bud. The buds are rough and almost white. Flowers not seen. Stamens inflected in the bud. The inflorescences are very heavy. (C. A. Gardner, Kimberleys.)

168. *E. rostrata* Schlecht. Flowers pale yellowish white or lemon yellow. (C. A. Gardner, Kimberleys.)

*E. saligna* Sm. Scott, M. H. "The *Saligna* Gum (*E. saligna*). Notes on its physical qualities, conversion and uses." (*South African Journ. of Industries*, August, 1924.) The author suggests it may supply some of the demand for soft wood in South Africa.

216. *E. terminalis* F.v.M. Flowers in a terminal corymbose panicle, white; calyx-tube obconical or turbinate, glaucous, with a slightly spreading rim; flowers only seen in a very advanced state; style thick, shorter than the filaments, the stigma capitate. Fruits narrow urceolate, about 1¼-inch long, contracted at the orifice, glaucous, the capsule deeply sunk.

*E. viminalis* Labill. Known at Lithgow (Blue Mountains, N.S.W.) as Gum or White Gum. It is disposed of by the Barlow Timber Co. as Mountain Ash. Local millers and purchasers of the timber with whom Mr. V. H. Hadley has spoken have not any great regard for it. Vicinity of Hampton, Jenolan Caves Road.

## Fruits.

257. *E. Blaxlandi* Maiden and Cabbage. (See *E. capitellata* below.)

120. *E. cæsia* Benth. "Pedicels stout, terete, up to 4 cm. long, fruits pendulous; peduncles terete, curved; fruits truncate-ovate in shape, 3 cm. long by 2.5 cm. broad striate, tapering somewhat abruptly into the pedicel. The resemblance in the fruits to those of *E. leucoxylon* F.v.M. var. *macrocarpa* J. E. Brown (present work, Part XII, p. 56, fig. 12) is considerable." (J.H.M. in *Journ. Roy. Soc., N.S.W.*, li, 446, 1917.)

3. *E. calycogona* Turcz. "Fruits from W. J. Spafford (Yeelanna and Butler, Eyre's Peninsula, S.A.) are the largest I have seen, and remind one of those of *E. Forrestiana* and *E. tetraptera*." (J.H.M. in *Journ. Roy. Soc., N.S.W.*, lii, 486, 1918.) Smaller than in the typical form, showing an approach to those of *E. celastroides*. No. 2110. Harrismith (C. A. Gardner).

83. *E. Campaspe* S. le M. Moore. "Much larger than any previously seen, very glaucous, with scarcely exerted valves. The valves of the typical form have long protruding points." (C. A. Gardner, Coolgardie.)

17. *E. capitellata* Sm. The figure of *E. capitellata* fruit in Baker and Smith's "Research," &c., Ed. II, p. 260, is *E. Blaxlandi* Maiden and Cabbage.

8. *E. coccifera* Hook. f. "About 1 centimetre long and broad, very flat, and not at all constricted at the top, the rim broad, flat or convex. On Mount Faulkner, Cradle Mount, Western Tiers, and Great Lake, the fruits are much smaller and more numerous in the umbel, sometimes being typically flat above, with a broad rim; at others more constricted, with a depressed rim." (L. Rodway, in *Proc. Roy. Soc., Tas.*, 1917.)

334. *E. conglobata* (R.Br.) Maiden. A form with large fruits nearly twice the size of the normal form. Grasspatch, Western Australia (C. A. Gardner, No. 2220).

104. *E. cordata* Labill. "The fruit is nearly spherical, and about 1 centimetre diameter to rather more; the rim is rather broad, the valves deeply sunk." (L. Rodway, in *Proc. Roy. Soc., Tas.*, 1917.)

205. *E. corymbosa* Sm. "We examined a large number of the fruits in various parts of the Upper Clarence district, N.S.W., and were impressed with their remarkable variation in size, which ranged from very small to very large, from trees growing together. The large quantity of fruit on some trees caused the branches to break with their weight. We could not see anything in the bark or any other character of the tree which differed from the normal form. Inquiries were made amongst the station hands at Ramornie as to the possibility of there being two different kinds of rough-barked Bloodwood, but we were all thoroughly convinced that there was only one kind in the district." (W. F. Blakely and D. W. C. Shiress.)

351. *E. crucis* Maiden. "Larger than in *E. Websteriana*, the rim more convex and the capsule more exserted." (C. A. Gardner, Yorkrakine, W.A.)

217. *E. dichromophloia* F.v.M. "Very variable in size." (C. A. Gardner, Kimberleys, N.W. Australia.)

224. *E. Foelscheana* F.v.M. "Fruits pendulous." (The same.)

281. *E. Houseana* (W.V.F.) Maiden. "Fruits collected (immature) north of the Couchman Range, in sandy swampy places, were turbinate with prominent angles, otherwise similar to those described. Others almost hemispherical (also not seen quite mature), with a prominent rim and deeply sunk capsule, with short not protruding valves." (The same.)

90. *E. leptopoda* Benth. "With long bristly continuations of the valves of the capsules, showing affinity to *E. oleosa*." (F. A. Stoward, Wickepin, W.A.)

360. *E. Nowraensis* Maiden. The carpels separate readily in the young fruit, and are quite free from the wall of the calyx. They are somewhat similar to those figured in Part LXII, Plate 253, figs. 4a and 4d.

72. *E. oligantha* Schauer. "Campanulo-urceolate, under 4 lines long, rim thin, valves 4, included." (W. V. Fitzgerald MSS.)

192. *E. papuana* F.v.M. "Of comparatively large size, and are rather thin of papery texture or Angophoroid)." (Cloncurry, North Queensland, Captain S. A. White, No. 228.)

243. *E. perfoliata* R.Br. "Reddish, becoming brown with age." (C. A. Gardner, Kimberleys.)

94. *E. pyriformis* Turcz. var. *elongata*. Six cm. long, with four prominent wings. Top of fruit 3 cm. diameter. Greatest diameter of fruit 5.5 cm. This is the largest fruit I have seen, and was collected by C. E. Chapman at Mullewa, W.A.

Vars., *minor* and *Rameliana*. Mr. D. A. Herbert informed me that he and Mr. E. H. Wilson had collected the above varieties off the same shrub. I did not see the specimens.

57. *E. sideroxylon* A. Cunn. "The fruits are usually as figured at Plate 55, but I have received from the Forestry Commission from near Eden, N.S.W., fruits as large as those of the related *E. leucoxylon* F.v.M. var. *macrocarpa* J. E. Brown, figured at 12 c, Pl. 56." (J.H.M. in *Journ. Roy. Soc., N.S.W.*, lii, 510, 1918.)

## Adjustment of Botanical Descriptions.

It is sometimes necessary to amend a description, and sometimes to adopt and regularise what has hitherto been a *nomen nudum*. Following are a few references :—

- (1) *E. diversifolia* Bonpl., including *E. santalifolia* F.v.M., Part VIII, p. 198. See also a discussion of the matter under *E. pachyloma* Benth., in Part XXXIII, pp. 84–88.
- (2) *E. hemiphloia* F.v.M. See Part XI, p. 14, for a case of the adoption of a *nomen nudum* by Bentham.
- (3) *E. goniocalyx* F.v.M., and *E. elæophora* F.v.M. In Part XIX, pp. 267, 268, will be seen an account of the confusion which has arisen through the confusion by Mueller of two of his own species, and the compromise I propose in the interests of a stable nomenclature.
- (4) *E. gigantea* Hook. f. See Part XX, p. 291, for the rectification of a description, this species and *E. obliqua* L'Hérit., having become confused.
- (5) *E. Stuartiana* F.v.M. There are no less than three distinct species described by Mueller under this name, and what I have termed the "Stuartiana confusion" is explained and rectified at Part XXI, p. 4, Part XXIV, p. 68, and Part LXX, p. 467. Mr. Baker attempts to rectify the confusion by adding *E. Bridgesiana* Baker to an over-burdened synonymy; this produces taxonomic surfeit.
- (6) *E. resinifera* Sm. See Part XXX, p. 208. This is a classical case of the rehabilitation by Bentham of an unsatisfactory species, which dated from the early days of New South Wales. Bentham's compromise has been accepted on all sides.

The question of the adjustment of a species is also referred to by Bentham under *Endiandra hypotephra* F.v.M., in *B.Fl.*, v., 301. There are other instances, but perhaps the above are sufficiently representative.

Arising to some extent out of the above, we have the quotation of herbarium names not hitherto published, *e.g.*, Hooker in "Flora of New Zealand," p. 18, under *Melicytus ramiflorus* Forst., quotes *Tachites umbellulifera*, Banks et Sol. MSS. Britten, who has done work to secure stability of nomenclature which can never be forgotten, sometimes follows a similar course in the *Journal of Botany* when it seems justifiable.

## Additional Bibliographical Notes.

(The list given in Part I of this work has not been repeated, nor have the many bibliographical notes which are scattered throughout the text.)

*The First Eucalyptus Described.*—One is naturally disappointed that the “ Botany of Cook’s First Voyage ” (Banks and Solander) (edited by J. Britten), contains practically no Eucalypts. Vol. II includes two North Queensland species under Plate 116 (*E. alba*), and Plate 117 (*E. terminalis*). The latter is, however, probably *E. crebra* and not *E. terminalis* F.v.M.; see my note at Part XL, p. 306. The original of Plate 116 came from the Endeavour River, and the native name was “ Kaikur,” while that of Plate 117 came from Lizard Island, Thirsty Sound.

The first Eucalyptus was described by L’Héritier in his “ Sertum Anglicum,” published in Paris in 1788 from plants observed by him at Kew in the years 1786 and 1787, as stated on the title page. We have at p. 18 the original description of the genus Eucalyptus, then the words :—“ *Eucalyptus obliqua*, Tab. 20. Habitat in Nova Cambria, Nelson, Guil., Anderson.” This ends the reference. David Nelson and William Anderson were on Cook’s Third Voyage (1776–1779), as mentioned by me in Part II of the present work, p. 51, under *E. obliqua*).

In Aiton’s “ Hortus Kewensis,” ed. 1, vol. ii, p. 157 (1789) we have :

“ 1. Eucalyptus. L’Herit. sert. angl. tab. 20, *obliqua*. Oblique-leav’d Eucalyptus. Nat. of New South Wales. Introd. 1774 by Tobias Furneaux, Esq., Fl. July.”

(New South Wales included Tasmania in those days, the latter not being then known to be an Island.)

Tobias Furneaux was the Captain of the ship which visited the modern Tasmania (Adventure Bay) in the “ Adventure,” in Cook’s Second Voyage (1772–1774). It is quite possible that plants were raised from Furneaux’s seeds, collected in February, 1773, but L’Héritier described the species from plants collected in January, 1777, by Nelson and Anderson. As will be seen from L’Héritier’s figure, he had flowers and fruits, and they could not have been seedlings from Furneaux’s plants. If Aiton’s statement is true, he (or rather his officers) must have collected seeds of the trees, or branches bearing ripe fruits, and these found their way into Aiton’s hands in 1774. This would not alter the fact of the genus being based on the material of Nelson, but it would prove that the plant was in *cultivation* before the visit of Nelson and Anderson to Tasmania,

Mr. E. H. Wilson (Assistant Director of the Arnold Arboretum), in his interesting series of articles on his botanical travels in "The Garden Magazine" (New York) for May, 1923, p. 186, points out that "*E. obliqua* is not only the type of the genus, but also the first species introduced (into England), and this prior to the founding of the genus and the naming of this species from Nelson's (and Anderson's) material by L'Héritier."

(b) *Subsequent Eucalyptus Notes*.—The year 1788 was also the date of the foundation of Sydney, but by the close of the century only about a dozen species had been described, and all (with the exception of *obliqua*) came from Port Jackson. Then came the stay of Robert Brown at Sydney, and his longer Australian voyages, chiefly of circumnavigation; his *Eucalyptus* material is referred to below. Next in order we have the collections of Sieber, which were exclusively made in New South Wales, and which were described in the twenties under the auspices of A. P. de Candolle; together with the collections of Allan Cunningham, partly made in New South Wales. *Eucalypts* from that State (or Colony, as it was then) were described by other botanists in the early part of the nineteenth century, and, being the oldest settled Colony, and the principal seat of Government for many years, it is not surprising that most of the early *Eucalyptus* work was based on New South Wales material; that of Tasmania and Western Australia followed.

Andrews' "Botanical Repository," 1799–1801 (10 volumes, 4to.) contains some figures of *Eucalypts*.

Robert Brown was in Australia from 1800–4.

"Of the National Australian genus *Eucalyptus* only six species are referred to by Brown in his Collected Works. Hooker says Brown returned to England with the description of his plants written out<sup>1</sup>. If so, he had described in MSS. 100 species of *Eucalypts*<sup>2</sup>. These were, of course, not published. What became of the MSS. ? And how is it that Brown's successors have had to worry out *Eucalypts* without any help from Brown, who had such great opportunities, and who was the first botanist of his age ? The world is poorer through not knowing the views of Brown on such a widely diffused and difficult genus. Hooker<sup>3</sup> speaks of plants in Brown's care 'during half a century . . . ' they,<sup>4</sup> together with the rest of his magnificent collections were jealously closed to botanists."

"The reason why Bentham did not consult the British Museum herbarium for the 'Flora Australiensis' (the fact has been pointed out by you)<sup>5</sup>, was probably the result of Brown's attitude in years gone by." (Maiden in "Sir Joseph Banks, the Father of Australia," p. 42.)

<sup>1</sup> *Proc. Linn. Soc.*, 1886–7, p. 58.

<sup>2</sup> Flinders' "Voyage to Terra Australis," ii (Appendix), p. 547.

<sup>3</sup> *Icones Pl.*, vol. iv (3rd Series), p. 16.

<sup>4</sup> Presumably 1810–1858 (year of Brown's death).

<sup>5</sup> I am given to understand that I am wrong here. Bentham consulted the herbarium, or at least part of it, but not the Banksian plates (? the Solander MSS.). "Some of the Orders in Brown's herbarium, which Bentham wanted to consult for the Australian flora, were mislaid and could not be found." (1873, Daydon Jackson's "Life of Bentham," p. 226). See also p. 61 *infra*.

The above was part of a letter to Mr. James Britten of the British Museum, in 1907.

As a final attempt to definitely ascertain what the old British Museum botanists had written about the genus, I wrote in 1923 to Dr. A. B. Rendle, F.R.S., Keeper of Botany at the British Museum, and following is his reply :—

“As regards MSS. of *Eucalyptus* of the older botanists, I find that the Solander MSS. include nothing on the genus; of Brown we have a number of rough descriptions made (in Latin) at the time of collecting. . . . In any case I think you would find them of little use without the specimens, of which they are more or less incomplete descriptions. Frankly, I do not think it would be worth the labour of copying, especially as it would have to be done by a person with a knowledge of both Latin and botany.”

The National Herbarium of New South Wales is under deep obligation to both Mr. Britten and Dr. Rendle for valuable information and specimens. After consultation with botanists in this and some other States, I have stated the position as to the work of early botanists on Australian plants, so far as I know it. The matter is now closed so far as I am concerned, and I am grateful to Mr. Britten and Dr. Rendle.

George Caley, one of the Banksian botanical collectors, was in New South Wales from 1800–10 (under Brown's direction till 1804). Some account of him will be found in my “Sir Joseph Banks,” p. 127. At p. 130 will be found details of his journey to the Cowpastures, Nattai, Stonequarry Creek, &c. There is a note at p. 133 on the pile of stones erroneously called “Caley's Repulse,” but he was never on the Blue Mountains proper. He went up the valley of the Grose (from its confluence with the Nepean) to Grose's Head (a name given by Caley himself) and beyond. See under *E. eximia*, Part XLII, p. 30. He collected abundantly in the County of Cumberland, particularly in the Parramatta district.

Willdenow, “*Species Plantarum*” (1797) and Persoon *Synopsis Plantarum* (1807), both followed Smith's list of species of 1797.

Sprengel's “*Systema Vegetabilium*” (16th edition) was published in 1826, and vol. ii, p. 500, in 1825. He enumerates twenty-four species, grouped according to the conical or hemispherical operculum.

Concerning Turczaninow (a Russian botanist, who purchased a set of Drummond's Western Australian plants), the following is a note in the Kew copy of the third volume of Bentham's “*Flora Australiensis*” :—“For seventy-seven species (of Myrtaceæ) omitted from this work, see Turczaninow in *Bull. Phys. Mathem. Acad. Sc.*, St. Petersburg, x, p. 321 (1852).”



Bentham's "Flora Australiensis," seven volumes (1863-1878). Vol. iii (1866) contains the Eucalypts. Asa Gray, the very distinguished American taxonomist, wrote of it :—

"The greatest Flora written in English, we might say the best great Flora in any language which has ever been produced and completed." (*Amer. Journ. Sci. and Arts*, 3rd Ser., xx, (1880).

Dr. L. Diels, of the Botanical Museum, Berlin (with a companion, Dr. E. Pritzel) travelled from 1900-2 in Australia, chiefly Western Australia, but in the other States also. The results of their researches (including the Eucalypts) were published by him in some valuable works, including "Fragmenta Phytographia Australiæ occidentalis" (with E. Pritzel in Engler's *Botan. Jahrbucher* xxxv, 55-662 (1905). See other works enumerated at Part LXVII, p. 319.

Cambage, R. H. This author has written extensively on the Eucalypts of New South Wales, and also an important paper on those of Northern Queensland. His work at one time as a mining surveyor led him to districts infrequently or not at all visited by other botanists, and he has very greatly improved our knowledge of the genus, particularly in regard to plant-geography, geology, and climate. His papers, including two series (see Part LXVII, p. 334), are chiefly, but not exclusively, published in the Journals of the Linnean and Royal Societies of New South Wales.

Fitzgerald, William Vincent. He wrote an important paper, "The Botany of the Kimberleys, North-west Australia" (*Journ. and Proc. Roy. Soc., W.A.*, iii, 1-123 (1918). In a note at p. 1, I (as editor, he was at the war) explained that his valuable Eucalyptus work is mainly represented in *Journ. Roy. Soc., N.S.W.*, vols. xlvii (1913); xlix (1915); li (1917), and how it came about. All Mr. Fitzgerald's species (including *striatocalyx* and *accedens* in *Journ. W.A. Nat. Hist. Soc.*, 1904) and notes, will be found in the present work.

It will be obvious to anyone who has perused this work, even superficially, that I have quoted an enormous number of authorities. I have always tried to consult originals, and to give the references and to copy the quotations accurately. In a few cases I have not been able to consult the originals, either because of the carelessness with which the references were set down, or because the originals were not accessible to me.

It has come home to me that some of my brother naturalists have been easy-going in quoting references, while others do not quote the *ipsissima verba*. This carelessness sometimes amounts to false quotation. I suggest that in all schools and universities where botany and zoology are taught, pupils be instructed in bibliography,

how to quote references, and, where extracts from originals are cited, such should clearly show, by the use of inverted commas, the precise words to be attributed to the original author. Another matter, and this is worthy of attention by the editors of Australian scientific publications—a uniform method of citation of scientific serials should be agreed to by them, acting under the authority of the councils of the several Societies. There is not always clearness as to the significance of Proceedings, Journal, Transactions, and the pernicious habit of having a pagination different in reprints from that of the original volumes from which they were taken, is not entirely stamped out.

Science is truth, and carelessness and false quotations are not truth, and therefore not contributions to science.

My own association with the genus began in an accidental way, and arose out of the unsatisfactory and even contradictory statements which I found current in regard to *Eucalyptus* timbers, a collection of which was got together by me in my capacity of Curator of the Technological Museum of New South Wales. (See a reference in Part LIII, p. 129.) Under works containing partial bibliographies of *Eucalyptus* may be cited my "A Bibliography of Australian Economic Botany," Technical Education Series, No. 10 (Sydney, 1892). *Eucalyptus* references will be found under: "General," especially p. 4; "Eucalyptus Oils and Eucalyptus in General," pp. 25-34; "Kinos," pp. 39, 40; "Eucalyptus Mannas and Lerp," pp. 41-43; "Timbers," pp. 45-52. The following articles in my "Forest Flora of New South Wales" contain bibliographies of *Eucalyptus* more or less useful:—"Australian Manna," Part LXIII; "Honey Plants," Part LXIV; "Insects and Timber-trees," Parts LXV and LXVI; "A Tentative Bibliography of Eucalyptus Oil," Part LXVII; "The Cultivation of Eucalypts in Countries outside Australia," Part LXVIII.

## COLOURED PLATES.

(N.B.—The horizontal line under the hypocotyl indicates the ground line.)

## PLATE 1.

*E. eugenoides* Sieb. (A—E).

- A. (D. 16), Mount Victoria, N.S.W., (J. L. Boorman, seed collected August, 1917). Hypocotyls and two pairs of reniform cotyledon leaves and of first leaves. Sown 28th November, 1917; drawn 5th January, 1918. Back of cotyledons purple-red.
- B, C, D. Same particulars as A, except dates of drawing.
- B. Drawn 28th February, 1918. Seedling with cotyledons and six opposite leaves.
- C. Drawn 28th February, 1918. A second seedling of the same sowing, with cotyledon leaves and eight leaves, the four uppermost alternate.
- D. Drawn 11th June, 1918. A seedling of the same sowing. The cotyledon-leaves have dropped off, are succeeded by two pairs of entire, opposite leaves, one pair of opposite incipiently crinkled leaves, two pairs of opposite crinkled leaves, and two pairs of alternate crinkled leaves. The leaves and rachis are coloured.
- E. Drawn 21st January, 1920. Height 2 ft. 2 in. A further stage showing rather thick, entire, alternate leaves.

*E. bicostata* Maiden, Blakely, and Simmonds (F—I).

- F. (x 100.) Upper Meroo, N.S.W. (Andrew Murphy, seed collected 15th January, 1918). Hypocotyls and two pairs of bilobed cotyledon leaves and one pair of first leaves. Sown 21st January, 1918; drawn 8th February, 1918.
- G, H, I. Same particulars as F, except dates of drawing.
- G. Drawn 19th March, 1918. Two cotyledon leaves, followed by one pair of slightly petiolate thin leaves, and three pairs of sessile thin leaves.
- H. Drawn 30th November, 1918. Height, 1 ft. 6 in. End of a branch showing several pairs of sessile opposite leaves with crimson midribs and quadrangular rachis.
- I. Drawn 16th March, 1920, height, 2 ft. 6 in. A pair of opposite leaves still further advanced.

## PLATE 2.

*E. calophylla* R.Br.

1. and 1a. (A. 85.) Perth, Western Australia (Woods and Forests Department). Two pairs of cotyledon leaves showing hypocotyls. The undersides are sometimes purple and sometimes green. Sown 23rd December, 1914; drawn 5th January, 1915.
2. (A. 85.) Perth, Western Australia. Seedling, showing a pair of cotyledons, a pair of opposite leaves, a pair of alternate leaves, succeeded by two pairs of opposite leaves. Oil dots distinct on the back, the undersides of the cotyledon leaves of a purple shade. Sown 7th July, 1911; drawn 23rd October, 1911.

In Plate 40 all the drawings are *E. eugenoides* Sieb., with the exception of 1a, cotyledon leaf, and 1b, first leaf, which were wrongly attributed to *E. marginata* Sm. They are really *E. calophylla* R.Br.

*E. ficifolia* F.v.M.

3. From a tree grown in the Botanic Gardens, Sydney (collected by J. L. Boorman, 1904). Seedling, showing pair of cotyledons, succeeded by a nearly opposite pair of first leaves and three pairs of more alternate ones. Leaves not peltate. Sown 6th June, 1905; drawn 26th September, 1905. Leaves non-peltate.



*E. EUGENIOIDES* SIEB., Figs. A-E.

*E. BICOSTATA* MAIDEN, BLAKELY, and SIMMONDS, Figs. F-I.

N.B.—The horizontal line under the hypocotyl indicates the ground line.





*E. CALOPHYLLA* R.Br., Figs. 1-2.

*E. PTYCHOCARPA* F.v.M., Figs. 5, 6.

*E. MINIATA* A. Cunn., Figs. 11-13.

*E. FICIFOLIA* F.v.M., Figs. 3, 4.

*E. FOELSCHIANA* F.v.M., Figs. 7, 8.

[See also Plate 268, Fig. 16.]



4. (64 H.H.). Irwin's Inlet, near South West Coast, Western Australia (F. Stoward, collected April and May, 1917). Upper portion of a seedling  $5\frac{1}{4}$  inches long. Sown 5th May, 1919,; drawn 20th October, 1919.

*E. ptychocarpa* F.v.M.

5. (Ref. No. 30.) Northern Territory, north of Lat.  $14^{\circ}$ . (W. S. Campbell.) Seedling, showing pair of cotyledon leaves and a pair of young, opposite first leaves. Back of cotyledon leaves green. Sown 18th September, 1913, drawn 27th October, 1913.
6. Same particulars as under 5. Seedling, further advanced, showing pair of cotyledon leaves and three pairs of first leaves. Sown 18th September, 1913; drawn 22nd December, 1913.

*E. Foelscheana* F.v.M.

7. (Ref. No. 27.) Edith Creek, near Darwin, Northern Territory (Prof. W. Baldwin Spencer, July-August, 1911). Seedling, showing cotyledon leaves, and one young pair of first leaves. Back of cotyledon leaves green. Sown 18th September, 1913; drawn 27th October, 1913.
- The same plant as 7, showing a pair of cotyledon leaves and six pairs of first leaves, varying from sessile to a petiole of 7 mm. The largest leaves have the longest petioles. Drawn 19th January, 1914.

This plant was again inspected on 22nd March, 1917, when it was 8 inches (20 cm. full) high. It was branched, but showed no difference in the leaves.

Portion of the seed which produced the above plants was resown on 14th December, 1917 (Ref. No. x 43). On 4th January, 1918, the seedlings were precisely similar to that already noted (No. 7). A seedling a little more advanced was drawn on 22nd January, 1918. Seen later (28th May, 1918) it was "identical" with fig. No. 8.

Another seedling (Ref. No. 41) of the same history as the preceding (Ref. No. 43), was examined on 28th May, 1918. This seedling was then 6 inches high, and was identical with No. 27, drawing dated 19th January, 1914 (fig. 8) except that the leaves were more shortly petiolate. The cotyledons were still attached. This seedling had deteriorated; at 8 inches high it was much branched and the leaves were all small and irregular in size. Stem still hairy.

B. 21, Northern Territory (W. S. Campbell, September, 1911). On 25th March, 1915, this seedling was examined. It agreed with No. 27 in the first and second stages, except that the glandular processes on stem and leaves were more pronounced.

X 44, Darwin, Northern Territory (G. F. Hill, 25th October, 1915). This seedling in the early stage appeared to be identical with No. 27 Northern Territory drawing dated 27th October, 1913.

Figs 9 and 10 will be found on Plate 3, under *E. eximia*.

*E. miniata* A. Cunn.

11. (Ref. No. 126 H.H.), Darwin, Northern Territory, where it is said to be rare (Horace Brown, per D. W. C. Shiress). Seedling with pair of cotyledon leaves, the petioles of which are partly subterranean. The undersides of the cotyledon leaves are of a paler green. Sown 3rd May, 1920; drawn 2nd September, 1920.

One seedling of the same sowing and number has the cotyledon leaves broader, resembling that of No. 12. Examined 14th December, 1920.

12. (Ref. No. 45), from Northern Territory, but received from Mr. E. W. Bick, Botanic Gardens, Brisbane, Queensland. Seedling with two cotyledon leaves supported by a hypocotyl of about 5 mm. Three pairs of lanceolate first leaves, which are covered with fine stellate hairs. Sown 1st October, 1915, drawn 30th December, 1915.



13. Same particulars as No. 12. Portion of seedling, consisting of one pair of opposite leaves and of six alternate leaves, the whole plant covered with fine, stellate hairs.

(Ref. No. 154 H.H.). From Tropical Western Australia (H. Steedman, Perth). Seedlings from seeds sown 30th October, 1922, have subterranean petioles of the cotyledon leaves as figured in 11; stellate hairs and larger leaves, thickish and whitish (glaucous) in colour, contrasting in appearance with Nos. 12 and 13.

### PLATE 3.

*E. eximia* Schauer.

9. (Ref. No. 419.) Berowra, about 8 miles south from the railway bridge, Hawkesbury River, N.S.W. (Andrew Murphy, 1913). Seedling with two pairs of cotyledon leaves and two pairs of petiolate opposite first leaves. The undersides of the cotyledon leaves of a deep purple, with a faint purplish tint on the undersides of the other leaves. Sown 3rd December, 1914; drawn 12th January, 1915.
10. (Same particulars as No. 9.) Upper portion of a seedling, showing alternate leaves, and all of them slightly peltate. The lower leaves, not depicted, are also peltate. The colour of the underside of the lowest depicted foreshortened leaf can be seen. The whole seedling, and particularly the rachis, petiole, and veins plentifully besprinkled with reddish glandular hairs. Drawn 13th April, 1915.

Nos. 11, 12, and 13 will be found on Plate 3, under *E. miniata*.

Ref. No. X 90, Gosford, N.S.W. Seeds collected by Andrew Murphy, 15th January, 1918, and sown 22nd January, 1918. Seedlings drawn, but not reproduced. One drawn 6th May, 1918, has a lower pair of opposite leaves, and the upper leaves peltate. Other drawings resemble those of Nos. 9 and 10. At 8 inches high most of the leaves alternate and slightly peltate. A more advanced seedling, 9½ inches in height on 6th May, 1918, has all the leaves alternate, long lanceolate, almost glabrous, and scarcely peltate. A pair of nearly opposite leaves drawn 19th January, 1920, from a seedling 1 ft. 8 in. high, and depicted 10½ inches from the top, are perfectly glabrous, not peltate, thickness, venation and shape approaching that of mature leaves.

*E. hæmatoxylon* Maiden.

14. (Ref. No. 922), "Mountain Gum," Jarrahwood, Busselton, W.A. (Forest Ranger W. Donovan, through Department of Woods and Forests, Perth, W.A.). Seedling with hypocotyl, one pair of cotyledon leaves and one pair of very young first leaves. Sown 19th February, 1914; drawn 13th March, 1914.

No. 108 from Jarrahwood, Busselton, W.A. (F. Stoward) is the same as No. 14 above.

15. (Same particulars as No. 14.) Underside of cotyledon leaves purple. Seedling with large cotyledon leaves and three pairs of first leaves and three pairs of first leaves much smaller and with much shorter petioles than the cotyledon leaves.

No. 15 was sown on the same day as No. 14, and drawn on the same day.

Ref. No. 886, *E. hæmatoxylon*, from the same source, had been previously sown on 18th July, 1913, and drawn 27th November, 1913, as a sturdy seedling of 25 cm., and therefore too large for reproduction at present. The largest leaf is 9 cm. by 5 cm. broad. The seedling is just beginning to get out of the opposite-leaved stage, and the petioles of both cotyledons and first leaves are about 1 cm. long. All the leaves are peltate except the final one depicted. Hairs on the rachises, petioles, edges of the leaves and on the principal veins, diminishing in number, as usual, as growth proceeds.

This species has, under the numbers X6 (drawing and photograph) and 108 (drawing) been practically grown on to the mature-leaf stage.



*E. EXIMIA* SCHAUER, Figs. 9, 10.  
*E. MARGINATA* SM., Figs. 16-18.  
*E. SEPULCRALIS* F.v.M., Figs. 20, 21.

*E. HEMATOXYLON* MAIDEN, Figs. 14, 15.  
*E. BUPRESTIUM* F.v.M., Fig. 19.  
*E. PLANCHONIANA* F.v.M., Figs. 22, 23.



*E. marginata* Sm.

16. Perth, W.A. (Woods and Forests Department). Seedling showing the petioles of two cotyledon leaves and the hypocotyl largely subterranean. Underside of cotyledon leaves slightly purple. Sown 16th August, 1904; drawn 29th September, 1904.

This seedling is 7 cm. high and has two pairs of opposite, practically sessile, lanceolate leaves on 10th January, 1905. Leaves still opposite, practically sessile, 5.5 cm. long, more definitely lanceolate, being broader towards the base, and venation more distinct, 29th March, 1905.

17. Perth district, W.A. (J. Staer, 1911). Seedling showing hypocotyl just above the ground line and one cotyledon leaf (the second one not depicted for reasons of space). The hypocotyl reduced to a mere thickening at the junction of the bases of the petioles of the cotyledons and of the ascending rachis (stem), on which are two small ovate, opposite leaves, and two still younger ones. A purple tint on the underside of the cotyledon leaves. Drawing not dated, but probably 1911.

18. (Ref. No. 217.) Perth district, W.A. (Andrew Murphy). Lower portion of a seedling 21 cm. long (say 8½ inches). The whole of the seedling has two cotyledon leaves (one shown) and five pairs (three shown) of opposite, lanceolate leaves separated by fairly long internodes. Sown 24th May, 1906, drawn 13th November, 1906.

A new sowing of A 19, seedling examined 29th December, 1914, and of A 15, examined 16th February, 1915, agrees with the drawing of No. 18.

*E. buprestium* F.v.M.

19. (Ref. No. 37 H.H.). Kalgan Plains, north of Kalgan River, Albany district, W.A. (J.H.M., 12th October, 1909). Seedling (ground line not shown) with pair of cotyledon leaves and two pairs of sessile opposite first leaves. Sown 28th April, 1919; drawn 29th July, 1919.

On 13th October, 1919, 7 inches high with opposite, sessile ovate or ovate-oblong leaves.

On 3rd December, 1919, 8 inches high.

On 18th October, 1920, 15½ inches high, leaves still opposite, and becoming narrower.

*E. sepulchralis* F.v.M.

20. (Ref. No. 23 H.H.). Eyre's Range, back of Bremer Bay, South Coast, W.A. (J. Wellstead). Two seedlings showing cotyledon leaves and very young first leaves. Sown 19th December, 1918; drawn 29th January, 1919.

21. (Same particulars as No. 20, but drawn 1st March, 1919). The seedling shows enlargement of the cotyledon leaves and two pairs of sessile oblong-lanceolate leaves.

On 22nd October, 1919, this seedling was 5 inches high; the lower leaves had fallen off (perhaps through want of water), and the upper leaves were still sessile (or nearly so), opposite and bluntly lanceolate.

*E. Planchoniana* F.v.M.

22. (Ref. No. X 55.) Stradbroke Island, Southern Queensland (C. T. White, 12th December, 1917). Seedling showing pair of cotyledon leaves, succeeded by a pair of young first leaves. Sown 20th December, 1917; drawn 29th January, 1918.

Drawn on 11th March, 1918, this seedling shows two first leaves 5 cm. long and 12 mm. long, sessile and bluntly lanceolate; also a pair of young first leaves.

23. (Particulars the same as No. 22.) Drawn on 11th March, 1918, a second seedling (see final paragraph under No. 22) shows two pairs of opposite, almost sessile, lanceolate first leaves about 6 cm. long and 2 cm. broad.

## PLATE 4.

*E. setosa* F.v.M.

24. Woolgni, Northern Territory (Dr. H. I. Jensen, July, 1916). Seedling with two cotyledon leaves and two pairs of very young leaves. The cotyledons are slightly coloured above, pale-green beneath. Sown 14th December, 1917; drawn 7th January, 1918.
25. (Ref. No. A 13.) Northern Territory (G. F. Hill, No. 398, 29th June, 1911). Seedling more advanced than fig. 24. Sown 3rd December, 1914; drawn 15th December, 1914.
- 25a. The same plant as No. 25, drawn 9th May, 1915, still in the opposite stage.

*E. terminalis* F.v.M.

26. (Ref. No. 59 H.H.). Near Rifle Pit, Darwin (G. F. Hill, 5th August, 1916). Seedling with the cotyledons attached and four pairs of opposite elliptical leaves above them. Note the filiform petioles to the cotyledons. Sown 5th May, 1919; drawn 14th October, 1919.
27. The same plant at 6 inches high, drawn 16th February, 1920. The leaves are now more elongated and oblong.  
Seen again at 9 inches high, the upper leaves had grown from 7 cm. to 10 cm. long, and still oblong, but much narrowed into the petiole, and darker in colour.
- 27a. (Same particulars as No. 27), drawn 22nd March, 1920. An opposite leaf from a plant 6 inches high which has changed from oblong to narrow-lanceolate.
28. (Same particulars as the preceding), drawn 8th March, 1921. The plant at that date was 14 inches high and just breaking into the alternate stage. The alternate leaf depicted is somewhat oblong abruptly acute, 12 cm. long, 28 mm. broad in the middle.

*E. maculata* Hook.

- 29a. (Ref. No. X 93.) Gosford (Andrew Murphy, 15th January, 1918). A seedling with two cotyledons, and two alternate leaves immediately above them.
29. (Same particulars as 29a), drawn 23rd November, 1918. Two peltate leaves from a seedling 9½ inches high.  
Figs. 30 and 31 will be found on Plate 5.

*E. peltata* Benth.

32. (Ref. No. B 12.) Beta, Queensland (J. L. Boorman, August, 1912). A seedling showing the filiform hypocotyl and the two cotyledons. Sown 25th September, 1912; drawn 17th October, 1912.
33. (Ref. No. B 25.) Alma-den, North Queensland (R. H. Cambage). Upper portion of a seedling 12 inches high, showing the broad, peltate leaves; the two lower ones are more distinctly alternate than the two above them. Sown 29th December, 1914; drawn 23rd March, 1915.

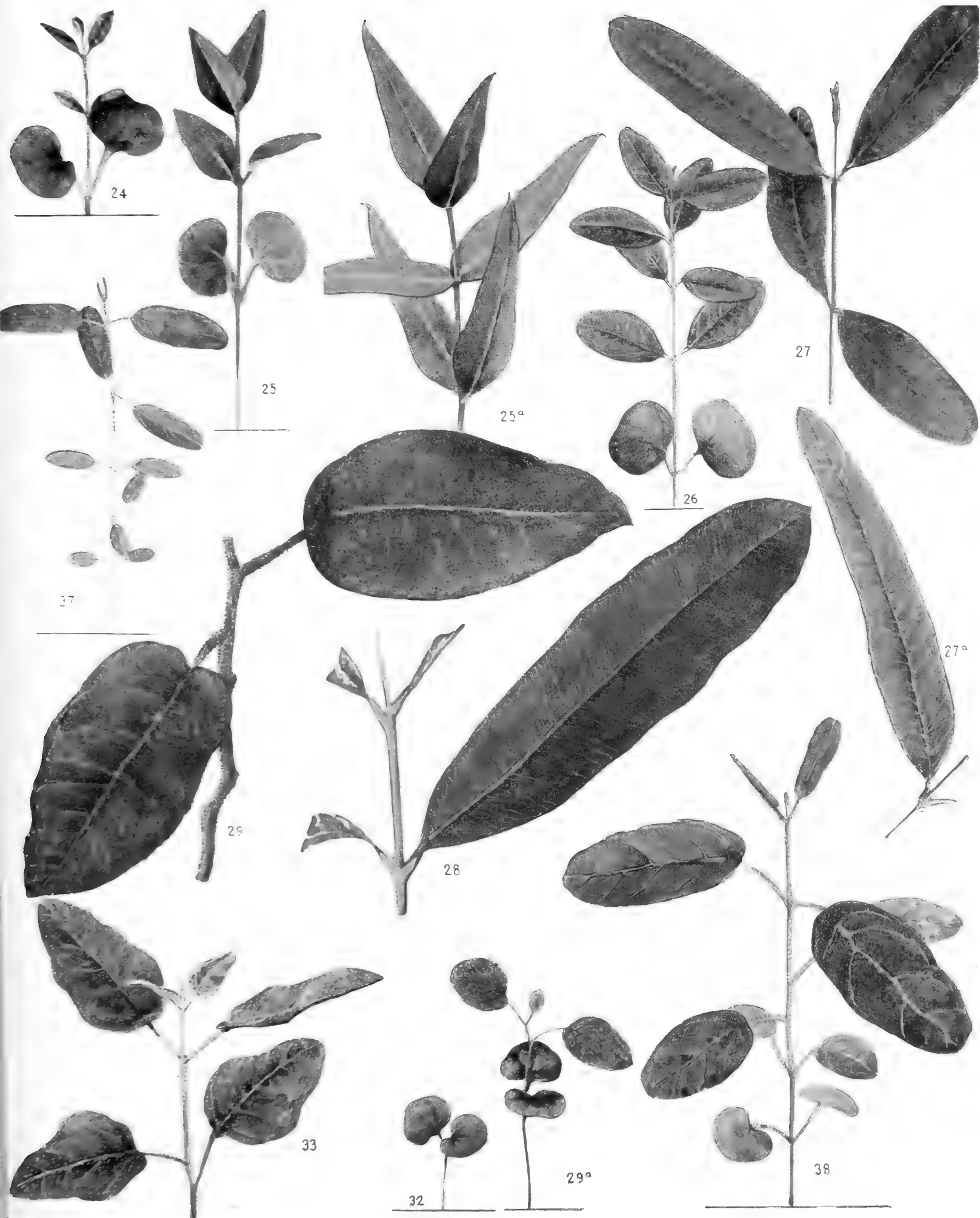
Figs. 34, 35 and 36 will be found on Plate 5.

*E. trachyphloia* F.v.M.

37. (Ref. No. X 198.) (See also Plate 5, figs. 34-36.) Maryborough, Queensland (C. T. White, February, 1918). A seedling 3 inches high, showing the slender, mature, elongated hypocotyl and four pairs of ovate to oblong leaves. Sown 5th October, 1920; drawn 8th February, 1921.  
At 10 inches high this seedling showed the characteristic peltate leaves, as shown in figs. 34 and 35, Plate 5.

*E. corymbosa* Sm.

38. (Ref. No. B 48.) Hornsby (W. F. Blakely, October, 1914). A seedling about 4 inches high, showing the hypocotyl, two cotyledons, first pair of leaves and six peltate leaves, the first two of which are alternate. Sown 29th December, 1914; drawn 4th March, 1915.



*E. SETOSA* F.v.M., Figs. 24-25a.

*E. MACULATA* Hook, Figs. 29, 29a.

*E. TRACHYPHLOIA* F.v.M., Fig. 37. [See also Plate 5, Figs. 34-36.]

*E. CORYMBOSA* Sm., Fig. 38.

*E. TERMINALIS* F.v.M., Figs. 26-28.

*E. PELTATA* BENTH., Figs. 32, 33.



The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales" \* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets :—

- |   |  |
|---|--|
| <i>acacioides</i> A. Cunn. (xlviii).                        | <i>melliodora</i> A. Cunn. (ix).                 |
| <i>acmenioides</i> Schauer (xxxii).                         | <i>microcorys</i> F.v.M. (xxxviii).              |
| <i>affinis</i> Deane and Maiden (lvi).                      | <i>microtheca</i> F.v.M. (lii).                  |
| <i>amygdalina</i> Labill. (xvi).                            | <i>Muelleriana</i> Howitt (xxx).                 |
| <i>Andrewsi</i> Maiden (xxi).                               | <i>numerosa</i> Maiden (xvii).                   |
| <i>Baileyana</i> F.v.M. (xxxv).                             | <i>obliqua</i> L'Hérit. (xxii).                  |
| <i>Bakeri</i> Maiden (lxx).                                 | <i>ochrophloia</i> F.v.M. (l).                   |
| <i>Baueriana</i> Schauer (lvii).                            | <i>odorata</i> Behr and Schlectendal (xli).      |
| <i>Baueriana</i> Schauer var. <i>conica</i> Maiden (lviii). | <i>oleosa</i> F.v.M. (lx).                       |
| <i>Behriana</i> F.v.M. (xlvi).                              | <i>paniculata</i> Sm. (viii).                    |
| <i>bicolor</i> A. Cunn. (xlv).                              | <i>pilularis</i> Sm. (xxxi).                     |
| <i>Boormani</i> Deane and Maiden (xlv).                     | <i>piperita</i> Sm. (xxxiii).                    |
| <i>Bosistoana</i> F.v.M. (xliii).                           | <i>Planchoniana</i> F.v.M. (xxiv).               |
| <i>Caleyi</i> Maiden (lv).                                  | <i>polyanthemos</i> Schauer (lix).               |
| <i>capitellata</i> Sm. (xxviii).                            | <i>populifolia</i> Hook. (xlvii).                |
| <i>conica</i> Deane and Maiden (lviii).                     | <i>propinqua</i> Deane and Maiden (lxi).         |
| <i>Consideniana</i> Maiden (xxxvi).                         | <i>punctata</i> DC. (x).                         |
| <i>coriacea</i> A. Cunn. (xv).                              | <i>radiata</i> Sieb. as <i>amygdalina</i> (xvi). |
| <i>corymbosa</i> Sm. (xii).                                 | <i>regnans</i> F.v.M. (xviii).                   |
| <i>crebra</i> F.v.M. (liii).                                | <i>resinifera</i> Sm. (iii).                     |
| <i>Dalrympleana</i> Maiden (lxiv).                          | <i>robusta</i> Sm. (lxviii).                     |
| <i>dives</i> Schauer (xix).                                 | <i>rostrata</i> Schlecht. (lxii).                |
| <i>dumosa</i> A. Cunn. (lxv).                               | <i>rubida</i> Deane and Maiden (xliii).          |
| <i>eugeniioides</i> Sieber (xxix).                          | <i>saligna</i> Sm. (iv).                         |
| <i>fruticetorum</i> F.v.M. (xlii).                          | <i>siderophloia</i> Benth. (xxxix).              |
| <i>gigantea</i> Hook. f. (li).                              | <i>sideroxylon</i> A. Cunn. (xiii).              |
| <i>globulus</i> Labill. (lxvii).                            | <i>Sieberiana</i> F.v.M. (xxxiv).                |
| <i>goniocalyx</i> F.v.M. (vi).                              | <i>Smithii</i> R. T. Baker (lxx).                |
| <i>hæmastoma</i> Sm. (xxxvii).                              | <i>stellulata</i> Sieb. (xiv).                   |
| <i>hemiphloia</i> F.v.M. (vi).                              | <i>tereticornis</i> Sm. (xi).                    |
| <i>longifolia</i> Link and Otto (ii).                       | <i>tessellaris</i> F.v.M. (lxvi).                |
| <i>Luehmanniana</i> F.v.M. (xxvi).                          | <i>Thozetiana</i> F.v.M. (xlix).                 |
| <i>macrorrhyncha</i> F.v.M. (xxvii).                        | <i>viminialis</i> Labill. (lxiv).                |
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| <i>Maideni</i> F.v.M. (lxix).                               | <i>vitrea</i> R. T. Baker (xxiii).               |
| <i>melanophloia</i> F.v.M. (liv).                           |  |

\* Government Printer, Sydney. 4to. Each part contains 4 plates and other illustrations.

NOTE BY GOVERNMENT PRINTER.

Financial conditions have so largely affected publications that it is no longer possible to continue the issue of "The Forest Flora of New South Wales" at the old rates, and from this date onward, *i.e.*, from and including Part 7, Vol. VII, the price of the individual Parts will be raised to 2s. 6d. each.

For those Parts already published the old sale price will be adhered to, and subscriptions already received will not be disturbed, but the new subscription rate of 2s. 6d. per part, or 25s. for 12 parts, will come into effect as from the 1st July, 1921.



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- 387. *E. pseudo-piperita* Maiden and Blakely, n.sp.
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- 389. *E. Callanii* Blakely.
- 390. *E. pachycalyx* Maiden and Blakely, n.sp.
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- 285. *E. rariflora* Bailey.
- 418. *E. polycarpa* F.v.M.
- 419. x *Langii* Maiden and Blakely, n.sp.
- 420. *E. pygmaea* Blakely.
- 421. *E. deformis* Blakely.
- 422. *E. aequans* Blakely.
- 423. *E. globoidea* Blakely.
- 424. *E. Bottii* Blakely.
- 425. *E. Robertsoni* Blakely.
- 426. *E. multicaulis* Blakely.
- 427. *E. Bleeseri* Blakely.
- 428. *E. Dielsii* Gardner.
- 429. *E. Gilleni* Ewart and L. R. Kerr.
- 137. *E. alba* Reinwardt.
- 430. *E. platyphylla* F.v.M.
- 431. *E. pastoralis* Spencer Moore.
- 432. *E. tectifera* F.v.M.

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1. A Botanical or Forest Survey.
2. Each State must work out its Botanical Survey.
3. The *E. albens* line.
- 3A. The Sydney enclave.
4. The relation between wheat-growing and rainfall, particularly as regards—
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  - (b) Goyder's Line of South Australia.

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PART XXXIX.

204. *E. Torelluna* F.v.M.  
 205. *E. corymbosa* Smith.  
 206. *E. intermedia* R. T. Baker.  
 207. *E. patellaris* F.v.M.  
 208. *E. celastroides* Turczaninow.  
 209. *E. gracilis* F.v.M.  
 210. *E. transcontinentalis* Maiden.  
 211. *E. longicornis* F.v.M.  
 73. *E. oleosa* F.v.M.  
 212. *E. Flocktoniae* Maiden.  
 28. *E. virgata* Sieber.  
 213. *E. oreades* R. T. Baker.  
 214. *E. obtusiflora* DC.  
 215. *E. fraxinoides* Deane and Maiden.  
 Plates 160-163. (Issued February, 1920.)

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 217. *E. dichromophloia* F.v.M.  
 218. *E. pyrophora* Benth.  
 219. *E. laevopinea* R. T. Baker.  
 220. *E. ligustrina* DC.  
 221. *E. stricta* Sieber.  
 222. *E. grandis* (Hill) Maiden.  
 Plates 164-167. (Issued March, 1920.)

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223. *E. latifolia* F.v.M.  
 224. *E. Foelscheana* F.v.M.  
 225. *E. Abergiana* F.v.M.  
 226. *E. pachyphylla* F.v.M.  
 114. *E. pyriformis* Turczaninow, var. *Kingsmilli* Maiden.  
 92. *E. Oldfieldii* F.v.M.  
 227. *E. Drummondii* Benth.  
 Plates 168-171. (Issued June, 1920.)

PART XLII.

228. *E. eximia* Schauer.  
 229. *E. peltata* Benth.  
 230. *E. Watsoniana* F.v.M.  
 231. *E. trachyphloia* F.v.M.  
 232. *E. hybrida* Maiden.  
 233. *E. Kruseana* F.v.M.  
 234. *E. Dawsoni* R. T. Baker.  
 62. *E. polyanthemus* Schauer.  
 64. *E. Baueriana* Schauer.  
 235. *E. conica* Deane and Maiden.  
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 Plates 172-175. (Issued August, 1920.)

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 237. *E. calophylla* R.Br.  
 238. *E. haematoxylon* Maiden.  
 239. *E. maculata* Hook.  
 240. *E. Mooreana* (W. V. Fitzgerald) Maiden.  
 241. *E. approximans* Maiden.  
 242. *E. Stowardii* Maiden.  
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243. *E. perfoliata* R. Brown.  
 244. *E. ptychocarpa* F.v.M.  
 245. *E. similis* Maiden.  
 246. *E. lirata* (W. V. Fitzgerald) Maiden, n.sp.  
 247. *E. Baileyana* F.v.M.  
 248. *E. Lane-Poolei* Maiden.  
 249. *E. Ewartiana* Maiden.  
 250. *E. Bakeri* Maiden.  
 251. *E. Jacksoni* Maiden.  
 252. *E. eremophila* Maiden.  
 Plates 180-183. (Issued February, 1921.)

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 254. *E. tetradonta* F.v.M.  
 255. *E. odontocarpa* F.v.M.  
 17. *E. capitellata* Smith.  
 256. *E. Camfieldi* Maiden.  
 257. *E. Blaxlandi* Maiden and Cambage.  
 258. *E. Normanstonensis* Maiden and Cambage  
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PART XLVI.

259. *E. tetragona* F.v.M.  
 260. *E. eudesmioides* F.v.M.  
 261. *E. Ebbanoensis* Maiden n.sp.  
 15. *E. Andreasi* Maiden.  
 262. *E. angophoroides* R. T. Baker.  
 263. *E. Kybeanensis* Maiden & Cambage.  
 264. (dup. of 252) *E. eremophila* Maiden.  
 70. *E. decipiens* Endl.  
 Plates 188-191. (Issued May, 1921.)

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265. *E. Laseroni* R. T. Baker.  
 266. *E. de Beuzevillei* Maiden.  
 267. *E. Mitchelliana* Cambage.  
 268. *E. Brownii* Maiden and Cambage.  
 269. *E. Cambageana* Maiden.  
 123. *E. miniata* A. Cunn.  
 44. *E. odorata* Behr. and Schlechtendal.  
 43. *E. hemiphloia* F.v.M., var. *microcarpa* Maiden.  
 42. *E. bicolor* A. Cunn.  
 270. *E. Pilligaensis* Maiden.  
 271. *E. Penrithensis* Maiden.  
 112. *E. micranthera* F.v.M.  
 272. *E. notabilis* Maiden.  
 273. *E. canaliculata* Maiden.  
 Plates 192-195. (Issued July, 1921.)

PART XLVIII.

61. *E. paniculata* Sm.  
 274. *E. decorticans* sp. nov.  
 275. *E. Culleni* R. H. Cambage.  
 276. *E. Beyerii* R. T. Baker.  
 98. *E. globulus* Labill.  
 277. *E. nova-anglica* Deane and Maiden.

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 The largest Australian trees.  
 Plates 196-199. (Issued August, 1921.)

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 38. *E. leptophleba* F.v.M.  
 279. *E. Dalrympleana* Maiden.  
 280. *E. Hillii* Maiden.  
 217. *E. dichromophloia* F.v.M.

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 The flowering of Eucalypts while in the juvenile leaf stage.  
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 Fasciation. Tumours and galls.  
 Protuberances of the stem.  
 Abortive branches (prickly stems)  
 Pendulous branches.  
 Vertical growth of trees.  
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 282. *E. Jutsoni* Maiden.  
 283. *E. adjuncta* Maiden.  
 1. *E. pilularis* Sm., var. *pyriformis* Maiden.  
 284. *E. pumila* Cambage.  
 285. *E. rariflora* F. M. Bailey.  
 286. *E. Mundijongensis* Maiden.

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 289. *E. taeniola* Baker and Smith.  
 92. *E. Stricklandi* Maiden.  
 290. *E. unialata* Baker and Smith.  
 31. *E. Plancheniana* F.v.M.  
 91. *E. marginata* Sm.  
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 292. *E. Yarraensis* Maiden and Cambage, n.sp.

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 5. *Schizophloia* (Ironbarks).  
 6. *Lerdophloia* (Barks friable and lamellar).  
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 293. x *E. antipoiensis* Trabut.  
 294. x *E. Bourlieri* Trabut.  
 295. x *E. Cordieri* Trabut.  
 296. x *E. gomphocornuta* Trabut.  
 297. x *E. jugalis* Naudin.  
*E. occidentalis* Endl., var. *oranensis* Trabut.  
 298. x *E. pseudo-globulus* (Hort.) Naudin.  
 299. x *E. Trabuti* Vilmorin.  
*E. Stuartiana* x *globulus* Trabut.  
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 306. x *E. Auburnensis* Maiden n.sp.  
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 308. x *E. Blackburniana* Maiden.  
 309. x *E. Studleyensis* Maiden n.sp.

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 Modern Systems of Classification.  
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 313. *E. Milligani* R. M. Johnston.  
 314. *E. Delftii* Ettingshausen.  
 315. *E. Diemenii* Ettingshausen.  
 316. *E. Hayi* Ettingshausen.  
 317. *E. Houtmanni* Ettingshausen.  
 318. *E. Mitchellii* Ettingshausen.  
 319. *E. cretacea* Ettingshausen.  
 320. *E. Davidsoni* Ettingshausen.  
 321. *E. Oxleyana* Ettingshausen.  
 322. *E. scottophylla* Ettingshausen.  
 323. *E. Warraghiana* Ettingshausen.  
 324. *E. praecoriacea* Deane.  
 325. *E. Hermant* Deane  
 326. *E. Howitti* Deane.  
 327. *E. Kitsoni* Deane.  
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 329. *E. Chapmani* formerly *E. Woollii* Deane

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G.—*E. (?) americana* Lesqx.  
H.—*E. borealis* Heer.  
I.—*E. angusta* Velenovsky.  
J.—*E. dubia* Ettingshausen.  
K.—*E. dakotensis* Lesquereux.  
L.—*E. Gouldii* Ward.  
M.—*E. proto-Geinitzi* Saporta.  
N.—*E. Choffati* Saporta.  
O.—*E. (?) attenuata* Newberry.  
P.—*E. (?) angustifolia* Newberry.  
Q.—*E. (?) nervosa* Newberry.  
R.—*E. (?) parvifolia* Newberry.  
S.—*E. latifolia* Hollick.  
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331. *E. Umbraecarrensis* n.sp.  
332. *E. leptophylla* F.v.M.  
68. *E. uncinata* Turcz.  
333. *E. angusta* n.sp.  
21. *E. marginata* Sm.  
22. *E. buprestium* F.v.M.  
41. *E. Bosistoana* F.v.M.  
213. *E. altior* (Deane and Maiden) Maiden.  
334. *E. conglobata* (R.Br.), Maiden.  
335. *E. angulosa* Schauer.  
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- A.—Juvenile Leaf. Historical. Morphological.  
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337. *E. Simmondsii* n.sp.  
23. *E. sepulcralis* F.v.M.  
200. *E. torquata* Luehmann.  
338. *E. Kalganensis* n.sp.  
339. *E. melanoxylon* n.sp.  
240. *E. Isingiana* n.sp.  
134. *E. aggregata* Deane and Maiden.

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343. *E. Rummeryi* n.sp.  
344. *E. Herbertiana* n.sp.  
345. *E. Comita-Vallis* n.sp.  
107. *E. longifolia* Link and Otto.  
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43. *E. hemiphloia* F.v.M.  
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54. *E. pruinosa* Schauer.  
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133. *E. Gunnii* Hook. f.  
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350. *E. Shiresii* Maiden and Blakely, n.sp.  
351. *E. crucis*, n.sp.  
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46. *E. acacioides* A. Cunn.  
56. *E. Naudiniana* F.v.M.  
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194. *E. Spenceriana* Maiden.  
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Enemies of Eucalypts.

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11. *E. Risdoni* Hook. f., var. *elata* Benth.  
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# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

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(Lately Government Botanist of New South Wales and Director of the  
Botanic Gardens, Sydney).

VOL. VIII. PART 4.

PART LXXIV OF THE  
COMPLETE WORK.  
(WITH FOUR PLATES.)



PRICE THREE SHILLINGS AND SIXPENCE.

*Published by Authority of*

THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

*Sydney :*

ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER.

1930.

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## PART IX.

24. *E. alpina* Lindl.  
25. *E. microcorys* F.v.M.  
26. *E. acmenioides* Schauer.  
27. *E. umbra* R. T. Baker.  
28. *E. virgata* Sieber.  
29. *E. apiculata* Baker and Smith.  
30. *E. Luehmanniana* F.v.M.  
31. *E. Planchoniana* F.v.M.  
Plates, 41-44. (Issued November, 1907.)

## PART X.

32. *E. piperita* Sm.  
33. *E. Sieberiana* F.v.M.  
34. *E. Consideniana* Maiden.  
35. *E. hamastoma* Sm.  
36. *E. siderophloia* Benth.  
37. *E. Boormani* Deane and Maiden.  
38. *E. leptophleba* F.v.M.  
39. *E. Behriana* F.v.M.  
40. *E. populifolia* Hook.  
41. *E. Bowmani* F.v.M. (Doubtful species.)  
Plates, 45-48. (Issued December, 1908.)

## PART XI.

41. *E. Bosistoana* F.v.M.  
42. *E. bicolor* A. Cunn.  
43. *E. hemiphloia* F.v.M.  
44. *E. odorata* Behr and Schlechtendal.  
44 (a). *An Ironbark* Box.  
45. *E. fruticetorum* F.v.M.  
46. *E. acacioides* A. Cunn.  
47. *E. Thozetiana* F.v.M.  
48. *E. ochrophloia* F.v.M.  
49. *E. microtheca* F.v.M.  
Plates, 49-52. (Issued February, 1910.)

## PART XII.

50. *E. Raveretiana* F.v.M.  
51. *E. crebra* F.v.M.  
52. *E. Staigeriana* F.v.M.  
53. *E. melanophloia* F.v.M.  
54. *E. pruinosa* Schauer.  
55. *E. Smithii* R. T. Baker.  
56. *E. Naudiniana* F.v.M.  
57. *E. sideroxylon* A. Cunn.  
58. *E. leucoxylon* F.v.M.  
59. *E. Caley* Maiden.  
Plates, 53-56. (Issued November, 1910.)

## PART XIII.

60. *E. affinis* Deane and Maiden.  
61. *E. paniculata* Sm.  
62. *E. polyanthemus* Schauer.  
63. *E. Rudderi* Maiden.  
64. *E. Baueriana* Schauer.  
65. *E. cneorifolia* DC.  
Plates, 57-60. (Issued July, 1911.)

## PART XIV.

66. *E. melliodora* A. Cunn.  
67. *E. fasciculosa* F.v.M.  
68. *E. uncinata* Turczaninow.  
69. *E. decipiens* Endl.  
70. *E. concolor* Schauer.  
71. *E. Clöeziana* F.v.M.  
72. *E. oligantha* Schauer.  
Plates, 61-64. (Issued March, 1912.)

## PART XV.

73. *E. oleosa* F.v.M.  
74. *E. Gillii* Maiden.  
75. *E. falcata* Turcz.  
Plates, 65-68. (Issued July, 1912.)

## PART XVI.

- E. oleosa* F.v.M., var. *Flocktonia* Maiden  
76. *E. Le Souefii* Maiden.  
77. *E. Clelandi* Maiden.  
78. *E. decurva* F.v.M.  
79. *E. doratoxylon* F.v.M.  
80. *E. corrugata* Luehmann.  
81. *E. goniantha* Turcz.  
82. *E. Stricklandi* Maiden.  
83. *E. Campaspe* S. le M. Moore.  
84. *E. diptera* Andrews.  
85. *E. Griffithsii* Maiden.  
86. *E. grossa* F.v.M.  
87. *E. Pimpiniana* Maiden.  
88. *E. Woodwardi* Maiden.  
Plates, 69-72. (Issued September, 1912.)

## PART XVII.

89. *E. salmonophloia* F.v.M.  
90. *E. leptopoda* Benth.  
91. *E. squamosa* Deane and Maiden.  
92. *E. Oldfieldii* F.v.M.  
93. *E. orbifolia* F.v.M.  
94. *E. pyriformis* Turczaninow.  
Plates, 73-76. (Issued February, 1913.)

## PART XVIII.

95. *E. macrocarpa* Hook.  
96. *E. Preissiana* Schauer.  
97. *E. megacarpa* F.v.M.  
98. *E. globulus* Labillardière.  
99. *E. Maidenii* F.v.M.  
100. *E. urnigera* Hook. f.  
Plates, 77-80. (Issued July, 1913.)

## PART XIX.

101. *E. goniocalyx* F.v.M.  
102. *E. nitens* Maiden.  
103. *E. elaeophora* F.v.M.  
104. *E. cordata* Labill.  
105. *E. angustissima* F.v.M.  
Plates, 81-84. (Issued December, 1913.)

## PART XX.

106. *E. gigantea* Hook. f.  
107. *E. longifolia* Link and Otto.  
108. *E. diversicolor* F.v.M.  
109. *E. Guilfoylei* Maiden.  
110. *E. patens* Benth.  
111. *E. Todtiana* F.v.M.  
112. *E. micranthera* F.v.M.  
Plates, 85-88. (Issued March, 1914.)

## PART XXI.

113. *E. cinerea* F.v.M.  
114. *E. pulverulenta* Sims.  
115. *E. cosmophylla* F.v.M.  
116. *E. gomphocephala* A. P. DC.  
Plates, 89-92. (Issued March, 1914.)

## PART XXII.

117. *E. erythronema* Turcz.  
118. *E. acaciiformis* Deane & Maiden.  
119. *E. pallidifolia* F.v.M.  
120. *E. caesia* Benth.  
121. *E. tetraptera* Turcz.  
122. *E. Forrestiana* Diels.  
123. *E. miniata* A. Cunn.  
124. *E. phœnicea* F.v.M.  
Plates, 93-96. (Issued April, 1915.)

## PART XXIII.

125. *E. robusta* Smith.  
126. *E. botryoides* Smith.  
127. *E. saligna* Smith.  
Plates, 97-100. (Issued July, 1915.)

## PART XXIV.

128. *E. Deanei* Maiden  
129. *E. Dunnii* Maiden.  
130. *E. Stuartiana* F.v.M.  
131. *E. Banksii* Maiden.  
132. *E. quadrangulata* Deane and Maiden.  
Plates, 100 bis-103. (Issued November, 1915.)

## PART XXV.

133. *E. Macarthuri* Deane and Maiden.  
134. *E. aggregata* Deane and Maiden.  
135. *E. parvifolia* Cambage.  
136. *E. alba* Reinwardt.  
Plates, 104-107. (Issued February, 1916.)

## PART XXVI.

138. *E. Perriniana* F.v.M.  
139. *E. Gunnii* Hook f.  
140. *E. rubida* Deane and Maiden.  
Plates, 108-111. (Issued April, 1916.)

## PART XXVII.

141. *E. maculosa* R. T. Baker.  
142. *E. praecox* Maiden.  
143. *E. ovata* Labill.  
144. *E. neglecta* Maiden.  
Plates, 112-115. (Issued July, 1916.)

## PART XXVIII.

145. *E. vernicosa* Hook f.  
146. *E. Muellieri* T. B. Moore.  
147. *E. Kitsoniana* (J. G. Luehmann) Maiden  
148. *E. viminialis* Labillardière.  
Plates, 116-119. (Issued December, 1916.)

## PART XXIX.

149. *E. Baeuerleni* F.v.M.  
150. *E. scoparia* Maiden.  
151. *E. Benthami* Maiden and Cambage.  
152. *E. propinqua* Deane and Maiden.  
153. *E. punctata* DC.  
154. *E. Kirtoniana* F.v.M.  
Plates, 120-123. (Issued February, 1917.)

## PART XXX.

155. *E. resinifera* Sm.  
156. *E. pellita* F.v.M.  
157. *E. brachyandra* F.v.M.  
Plates, 124-127. (Issued April, 1917.)

## PART XXXI.

158. *E. tereticornis* Smith.  
159. *E. Bancroftii* Maiden.  
160. *E. amphifolia* Naudin.  
Plates, 128-131. (Issued July, 1917.)

## PART XXXII.

161. *E. Seeana* Maiden.  
162. *E. exserta* F.v.M.  
163. *E. Parramattensis* C. Hall.  
164. *E. Blakelyi* Maiden.  
165. *E. dealbata* A. Cunn.  
166. *E. Morrisii* R. T. Baker.  
167. *E. Howittiana* F.v.M.  
Plates, 132-135. (Issued September, 1917.)

## PART XXXIII.

168. *E. rostrata* Schlechtendal.  
169. *E. rudis* Endlicher.  
170. *E. Dundasi* Maiden.  
171. *E. pachyloma* Berth.  
Plates, 136-139. (Issued December, 1917.)

## PART XXXIV.

172. *E. redunca* Schauer.  
173. *E. accedens* W. V. Fitzgerald.  
174. *E. cornuta* Labill.  
175. *E. Websteriana* Maiden.  
Plates, 140-143. (Issued April, 1918.)

## PART XXXV.

176. *E. Lehmanni* Preiss.  
177. *E. annulata* Benth.  
178. *E. platypus* Hooker.  
179. *E. spathulata* Hooker.  
180. *E. gamophylla* F.v.M.  
181. *E. argillacea* W. V. Fitzgerald.  
Plates, 144-147. (Issued August, 1918.)

## PART XXXVI.

182. *E. occidentalis* Endlicher.  
183. *E. macrandra* F.v.M.  
184. *E. salubris* F.v.M.  
185. *E. cladocalyx* F.v.M.  
186. *E. Cooperiana* F.v.M.  
187. *E. intertexta* R. T. Baker.  
188. *E. confluens* (W. V. Fitzgerald) Maiden.  
Plates, 148-151. (Issued January, 1919.)

## PART XXXVII.

189. *E. clavigera* A. Cunn.  
190. *E. aspera* F.v.M.  
191. *E. grandifolia* R.Br.  
192. *E. papuana* F.v.M.  
Plates, 152-155. (Issued March, 1919.)

## PART XXXVIII.

193. *E. tessellaris* F.v.M.  
194. *E. Spenceriana* Maiden.  
195. *E. Cliftoniana* W. V. Fitzgerald.  
196. *E. setosa* Schauer.  
197. *E. ferruginea* Schauer.  
198. *E. Moorei* Maiden and Cambage.  
199. *E. dumosa* A. Cunn.  
200. *E. torquata* Luehmann.  
201. *E. radiata* Sieber.  
202. *E. numerosa* Maiden.  
203. *E. nitida* Hook. f.  
Plates 156-159. (Issued July, 1919.)

# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

(Lately Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

---

The author of this standard work, Mr. J. H. Maiden, I.S.O., F.R.S., F.L.S., died on 16th November, 1925, at the age of 66 years.

It is most regrettable that he did not live to see the completion of his great work, of which 65 Parts have already appeared, and the final Parts were prepared by him for publication prior to his death.

With the kind permission of Dr. Darnell-Smith, Director, Botanic Gardens, Sydney, this and the subsequent Parts will be edited by Messrs. R. H. Cambage, C.B.E., F.L.S., and W. F. Blakely, Assistant Botanist, Botanic Gardens, both of whom have been in constant touch with the late Mr. Maiden during the progress of the work.

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## VOL. VIII. PART 4. Part LXXIV of the Complete Work.

(WITH FOUR PLATES.)

---

*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

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PRICE THREE SHILLINGS AND SIXPENCE.

*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney :

ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER, PHILLIP-STREET.



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## DIVISION RENIFORMAE.

### Section 2.—Medium Cotyledons.

- |                            |                                   |
|----------------------------|-----------------------------------|
| 2a. Corymbosæ-Peltatæ.     | 2d. Angophoroideæ.                |
| 2b. Corymbosæ-Non-peltatæ. | 2e. Sessile, ovate to lanceolate. |
| 2c. Eudesmeæ.              | 2f. Rigid semi-angular.           |

### Series 2a.—Corymbosæ-Peltatæ.

(With peltate leaves.)

- |                         |                       |
|-------------------------|-----------------------|
| <i>E. pyrophora.</i>    | <i>E. Torelliana.</i> |
| <i>E. trachyphloia.</i> | <i>E. Bloxsomei.</i>  |
| <i>E. corymbosa.</i>    | <i>E. maculata.</i>   |
| <i>E. peltata.</i>      | <i>E. citriodora.</i> |

*General Appearance.*—Leaves small ovate to oblong, and sub-spathulate, peltate, usually smaller and narrower than in Corymbosæ (large Cotyledons), and on the whole not quite so setose, except in *E. maculata*. The colour varies from light-yellowish green to dark green. The stems usually show the reddish colouring so characteristic in the genus. The intermediate leaves vary from long and narrow to broadish.

(1) *Hypocotyl.*

*E. pyrophora*, *E. trachyphloia*, *E. corymbosa*, *E. peltata*, *E. Bloxsomei*, *E. maculata*, *E. citriodora*, medium.

(1a) *Hypocotyl* (Miss Flockton).

*E. pyrophora*, red to deep red (Bourke).

*E. trachyphloia*, red (Bundaberg); terete, red, showing warty glands just below the cotyledons (Gungal).

*E. corymbosa*, terete, brownish-red (8-mile Plains); short, thick, shaded red, covered with prominent glandular processes (Jervis Bay); red and covered with prominent glands (Hornsby); red (Gosford, 8-mile Plains, and Rockhampton); short, smooth, light brown (Byron Bay); red, thick, short, covered with warty glands, thickening to the root (Lawrence).

*E. peltata*, red (Beta); tinted red, prominent warty glands (Alma-den).

*E. Bloxsomei*, terete, pinkish green (Hippong).

*E. maculata*, terete, and showing fine glandular processes unusual on the hypocotyl, tinted pink (Gosford); red, with scattered warty glands, slightly thickening to the root (Wyang); reddish, thickening to the root, with scattered warty glands (Wyang).

*E. citriodora*, smooth, red (Rockhampton); terete, pink, the surface rough with small warty glands (Emu Park); shaded pink, and covered with prominent warty glands (Stannary Hills).

(2) *Cotyledons* (Petiole, taper).

*E. pyrophora*, short.

*E. trachyphloia*, short.

*E. corymbosa*, medium.

*E. peltata*, short.

*E. Bloxsomei*, short.

*E. maculata*, short to medium.

*E. citriodora*, short to medium.

(2e) *Cotyledons* (Undersurface, Miss Flockton).

*E. pyrophora*, purple red (Bourke); green or faint pink (No. 5).

*E. trachyphloia*, purple (Bundaberg); red, glands on the petioles (Gungal).

*E. corymbosa*, green (8 Mile Plains and Byron Bay); deep crimson peduncle, also with glandular processes (Jervis Bay); rich purple, petioles also have glands (Hornsby); pale green (Lawrence); crimson (Gosford, also 35 miles north of Rockhampton).

*E. maculata*, undulate, green or puce (Gosford); red, glands on petioles (Wyang).

*E. peltata*, purple (seed from Brisbane); glands on petiole, underside green (Alma-den).

*E. Bloxsomei*, green (Hippong).

*E. citriodora*, deep red (Rockhampton); red (Emu Park); deep rich crimson (Stannary Hills.)

(3) *Stem* (Miss Flockton).

*E. pyrophora*, tinted red, with prominent warty glands (Bourke); smooth, green (No. 5).

*E. trachyphloia*, yellow-green, covered with long, red, glandular hairs (Bundaberg); terete, glands rather prominent. The prominent glands leave the stem after the alternate stage of the leaf begins (Gungal).

*E. corymbosa*, terete, green, shaded pink, covered with prominent glands (8 Mile Plains); terete, red, with prominent glands, getting less as the plant advances (Jervis Bay); shaded red, covered with long, irregular, glandular processes (Hornsby); covered with long glandular hairs (Gosford); terete, purple red, covered with long

glandular processes (Byron Bay); epicotyl covered with long glandular processes (Lawrence); after the first leaves covered with long irregular, glandular hairs (not stellate) (8 Mile Plains); after the cotyledons covered with long, irregular, glandular hairs (35 miles north of Rockhampton).

*E. peltata*, tubular, densely covered with pink, flaccid, glandular hairs (Beta); tinted purple, hairy above the cotyledons (seed received from Brisbane); terete, green, covered with long, pink, glandular processes (Alma-den).

*E. Bloxsomei*, terete and covered with very pale pink hair-like glands (Hippong).

*E. maculata*, with glands, but not so pronounced as in *E. citriodora*, branching early (Wyong, No. 1); shaded red, the glandular processes becoming longer and thicker towards the top of the plant (No. 2); terete, about 5 inches up covered with prominent glandular processes, after that smooth and shaded puce (Gosford).

*E. citriodora*, branching at the first or second node, covered with protuberant glands, which become long, glandular processes on the young growth of the seedlings (Rockhampton); terete, pale green, touched with pink and covered with long glandular processes (Stannary Hills).

#### (4) *First Pair of Leaves* (Petiole, shape, vestiture).

*E. pyrophora*, petiolate, ovate, glabrous, smaller and narrower than the cotyledons; rachis glandular.

*E. trachyphloia*, ovate to oblong, slightly hairy; rachis slightly hairy.

*E. corymbosa*, petiole long, ovate, slightly hairy, larger than the cotyledons, almost peltate; rachis hairy.

*E. peltata*, petiolate, ovate, hairy all over, much smaller than the cotyledons; rachis hairy.

*E. Bloxsomei*, petiole long, ovate-lanceolate, not half the size of the cotyledon; slightly hairy.

*E. maculata*, petiole long, ovate, glandular-hispid, usually much larger than the cotyledons; rachis glandular-hispid.

*E. citriodora*, petiolate, ovate, hairy to hispid all over, much smaller than the cotyledons; rachis hairy to hispid all over.

#### (5) *Subsequent Pairs of Leaves* (Number, petiole, shape, vestiture).

*E. pyrophora*, eight or more, petiole short, ovate to oblong, slightly hairy, light green, stem hispid.

*E. trachyphloia*, five or more, ovate, shortly petiolate, slightly hairy, light green, stem hairy, purple-brown.

*E. corymbosa*, third pair opposite, ovate peltate, petiole rather long, light green hispid, stem green, hispid.

*E. peltata*, six or more, ovate-lanceolate, hairy, light green, petiole rather long, stem green, hairy.

*E. Bloxsomei*, none, all alternate.

*E. maculata*, all alternate, rather long.

*E. citriodora*, three or more, rather long.

*Number of Peltate Leaves* (Number, shape, vestiture).

*E. pyrophora*, six, ovate to oblong lanceolate, ranging from 1.5 cm. long, 1 cm. broad, to 4 cm. long, 1 cm. broad, light green, slightly hairy, stem pale purple-brown, setose.

*E. trachyphloia*, twelve or more, ovate lanceolate, oblong-lanceolate, to long lanceolate, hairy, ranging from 3 cm. long, 2 cm. broad to 12 cm. long, 2.5 cm. broad, light-green—shaded pale purple-brown, more or less hairy, stem a rich purple-brown.

*E. corymbosa*, six or more, ovate to lanceolate, shortly petiolate, slightly stellate, ranging from 2.5 cm. long, 1 cm. broad. In the latter stage the margins are distinctly undulate and quite smooth.

*E. peltata*, numerous, ovate to almost cordate, undulate, very hispid, dark and slightly glossy above, pale and dull beneath, veins somewhat distinct, 6–10 cm. long, 3 to 6 cm. broad, petiole rather long, hispid.

*E. Bloxsomei*, one, lanceolate, slightly undulate, minutely setose, petiole rather long, 5 cm. long, 2 cm. broad, olive green, stem pale purple-brown, setose.

*E. maculata*, eight or more, ovate to elliptical-lanceolate, slightly undulate, setose, petiole rather long, ranging from 3 cm. long, 2.5 cm. broad, to 6 cm. long, 3 cm. broad, light green, stem green shaded pale purple-brown, setose.

*E. citriodora*, twelve or more, narrow to broadish lanceolate, undulate, the lamina upturned from the midrib, slightly setose, petioles medium, ranging from 4 cm. long 1 cm. broad, to 9 cm. long, 2.5 cm. broad, light green, stem light green.

*E. Torelliana*. No seedlings of this species are available, and the following description of the peltate leaves is taken from a young shoot eighteen inches long:—Twenty-two or more, ovate to broadly lanceolate, very hispid, more or less undulate, veins distant, the midrib conspicuous underneath, a dull purple-brown, intramarginal vein distant from the edge, 12 to 15 cm. long, 7 to 8.5 cm. broad, glossy above, dull beneath, petiole medium, slender, infested with long reddish setose hairs. Stem purple-brown, densely covered with hair-like seta (Atherton).

(6) *Intermediate Leaves*.

*E. pyrophora*, lanceolate, slightly tapering into the short petiole 6 cm. long, 1 cm. broad, light-green, tinged with yellowish green, stem purple-brown, smooth.

*E. trachyphloia*, not seen.

*E. corymbosa* (from a plant 4 feet high, planted out in the Gardens), oblong to oblong-lanceolate, slightly undulate, with a short mucro on the oblong leaves, midrib and petiole purple-brown, 18 to 24 cm. long, 5.5 to 6 cm. broad, dark green and shining above, pale green and dull beneath, veins more or less obscure, the intramarginal nerve close to the edge.

*E. maculata*, oblong-lanceolate to lanceolate, slightly undulate, 8 cm. long, 3.5 cm. broad, venation moderately distinct and distant, slightly raised, giving the leaf a rough appearance, light green, petiole short.

*E. citriodora*, not seen.

*E. peltata*, not seen.

*E. Bloxsomei*, lanceolate, rounded at base, slightly undulate, 10 cm. long, 3 cm. broad, veins distinct, distant, raised, the surface rough, light green, shaded yellowish-green, midrib partly purple-brown, slightly setose. Stem greenish, covered with purple-brown seta.

*E. Torelliana*. Intermediate leaves from a young shoot, as no seedlings were available. Ovate to ovate lanceolate, rounded at the base, thin, undulate, hispid, but not so rough as in the peltate leaves, veins prominent beneath, obscure above, rather distant, but more numerous than in the peltate form, shining above, dull and pale beneath, 7 to 10 cm. long, 4 to 6 cm. broad, petiole medium, covered with purple seta. Stem a dull purple-brown, clothed with fine purple seta (Atherton).

(6a) (Miss Flockton).

*E. pyrophora*.

1st leaves ovate, red back and edges, prominent warty glands. 1st alternate leaves lanceolate, with marked pale-coloured central nerve and fine parallel venation (Bourke).

1st leaves linear or narrow-lanceolate. 1st alternate leaves linear (No. 5).

*E. trachyphloia*.

1st leaves linear or linear-lanceolate, peltate, the recurved edge having scattered bristles, also along the midrib. 1st alternate leaves the same, larger, 8.5 cm. long (Bundaberg).

1st leaves ovate, crinkled, slightly peltate, undersurface pale green. Leaves lanceolate, undersurface paler, peltate (Gungal).

*E. corymbosa*.

1st leaves small ovate, with prominent glands on edges and midrib. Leaves lanceolate, light opaque green, a little paler on the undersurface, not peltate. The glands decrease in length and thickness with the age of the plant. Venation indistinct, intramarginal vein near the edge. (8 Mile Plains.)

1st leaves ovate, with glands on both sides. 1st alternate leaves lanceolate, sinuous, peltate, some glands (Jervis Bay).

*1st leaves* ovate, the edges and midrib with glandular processes, coloured red (Hornsby).

*1st leaves* ovate, dotted with prominent glands. *1st alternate leaves* ovate, peltate, with long glandular hairs (Gosford).

*1st leaves* ovate, pedunculate, glands on the edges and midrib. *Leaves more advanced*, large oblong, with glandular processes on the petioles, edges and principal veins, peltate (Byron Bay).

*1st leaves* ovate, the edges, midrib and principal veins having scattered glandular hairs. Back of leaf pale green. *1st alternate leaves*, plant 11 inches high, showing slight indications of becoming alternate (8 Mile Plains).

*1st leaves* ovate, dotted with prominent glands. *1st alternate leaves* the same, larger (35 miles north of Rockhampton).

#### *E. peltata.*

*1st leaves* ovate, covered with pale, soft hairs. *1st alternate leaves* lanceolate, slightly petiolate, with pink, long soft hairs on both sides of the midrib and along the edges. The hairs at first covering the leaves have fallen off in the alternate stage. This plant branched at the base, but afterwards ran up on stem 2 feet 6 inches high without sign of further branching (Beta).

*1st leaves* ovate-acute. *1st alternate leaves* lanceolate, fringed and covered with long, soft hairs (seed received from Brisbane).

*1st leaves* ovate, on both sides dotted all over with white glands. *1st alternate leaves* slightly peltate, undersurface pale green, with white glandular processes on both sides (Alma-den).

#### *E. Bloxsomei.*

*1st leaves* ovate-lanceolate, with soft whitish hair-like glands. At this stage it closely resembles *E. Watsoniana*, but is smaller and has glands more hair-like, softer and whiter in colour (Hippong).

#### *E. maculata.*

*1st leaves* ovate or orbicular, with scattered glands. Petiole long. The lower leaves ovate, petiolate, covered with the remains of glandular processes, leaving them dull in colour and harsh of touch, peltate. After about the twelfth leaf the surface becomes smooth and shining, the venation changes, and they are no longer peltate. Leaves alternate from the first (Gosford).

*1st leaves* small, ovate, slight purple shade on back. *1st alternate leaves* large (5.5 cm.), ovate, with glands all over the leaf-venation and edges, along petioles, the young leaves becoming peltate (Wyong).

*1st leaves* ovate, slight purple tint at back and warty glands dotted about on both sides of leaf. *1st alternate leaves* ovate, purple stain on back, scattered glands on both sides, long petioles, thickly studded with long glandular protuberances (Wyong).

*E. citridoora.*

*1st leaves* opposite, pedunculate, peltate, dotted over with glands, also on the edges. Glands not stellate. *1st alternate leaves* the same, larger (Rockhampton).

*1st leaves* ovate, the second pair peltate, and covered with white, transparent, glandular processes. *1st alternate leaves* lanceolate, petiolate, peltate, covered with hairs (Emu Park).

*1st leaves* ovate, peltate, with glandular hairs on the edges and midribs. *1st alternate leaves* lanceolate, peltate, with long hairs (Stannary Hills).

**Series 2b.—Corymbosae-Non-Peltatae.**

(Without peltate leaves.)

*E. terminalis.*

*E. setosa.*

*E. dichromophloia.*

*E. latifolia.*

*E. Watsoniana.*

*E. Cliftoniana.*

(Arranged according to size of cotyledons.)

*General Appearance.*—Leaves on the small side, ranging from ovate, oblong, to elliptical in the early stages, then changing to lanceolate, and in *E. terminalis* to attenuate-lanceolate, undulate. The first two species glabrous, and the remainder more or less setose. *E. setosa*, *E. latifolia* and *E. Cliftoniana* are smaller and greener than the three preceding ones. The colours of this group vary from light green to olive green, slightly tinged with purple-brown. Stems slender in the first three species, more robust in the last three. In *E. Watsoniana* it is flexuose, and resembles *E. Bloxsomei* in that character.

(1) *Hypocotyl.*

Medium, except occasionally (e.g., *E. terminalis*) very short.

(1a) *Hypocotyl* (Miss Flockton).

*E. terminalis*, short, thick, covered with transparent glands. Pale whitish green with pink tint (Darwin); terete, smooth and green (Eidsvold).

*E. dichromophloia*, generally short, tinted pink, small warty glands (Mount House); terete, pale green (Eidsvold).

*E. Watsoniana*, terete, red and sturdy, covered with prominent red glands (Delubra); terete, sturdy, red (crimson) with prominent glands (Botanic Gardens, Sydney).

*E. setosa*, pale green and with warty glands (N.T.A., 45); terete, pale yellow green, warty (Woolngi); long, pale green, thickening to the root (N.T.A., 13).

*E. latifolia*, terete, sturdy, glands, but not prominent, pale green, with a slight blush of pink (Cullen Creek and Woolngi); short, pinkish in colour (Cullen Creek).

*E. Cliftoniana*, smooth, green, tinted with red (Mount Anderson)



(2) *Cotyledons* (Petiole, taper, venation).

All taper more or less, except *E. Cliftoniana* and *E. latifolia*, in which it is very slight. All trinerved.

*E. terminalis*, medium.

*E. dichromophloia*, short to medium.

*E. Watsoniana*, short to medium, tapering into the petiole, triplinerved.

*E. setosa*, tapering into the petiole, triplinerved.

*E. latifolia*, short to medium.

*E. Cliftoniana*, short.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. terminalis*, undulate, strongly veined, of bright yellow green, with the underside pale green. Petioles with glands (Darwin); green (Eidsvold).

*E. dichromophloia*, green (Mount House and Eidsvold).

*E. Watsoniana*, green (Delubra); undulate undersurface green, with slight pink tint (Botanic Gardens, Sydney); undersurface pale (Botanic Gardens, Sydney).

*E. setosa*, pale green on both sides (N.T.A., 45); warty glands on the petioles (Woolgni); delicate pale green on both sides (N.T.A., 13).

*E. latifolia*, green, glands on petioles (Cullen Creek).

*E. Cliftoniana*, petiole, with a few warty glands (Mount Anderson).

(3) *Stem* (Miss Flockton).

*E. terminalis*, thin, wiry, glandular (Eidsvold).

*E. dichromophloia*, terete, shaded red, covered with prominent glandular processes (Mount House).

*E. Watsoniana*, terete, green, covered with pinkish, red glands (Delubra); epicotyl terete, glandular, pink. The entire seedling in the early stage is covered with prominent glandular processes, except the cotyledons (Botanic Gardens, Sydney); with warty processes, becoming smooth after the fourth alternate leaf (Botanic Gardens, Sydney); terete, red, with prominent glands (Botanic Gardens, Sydney).

*E. setosa*, green, shaded pink, covered with prickly hairs or glandular processes (N.T.A., 45); terete, pale green, with prominent glands. The epicotyl has transparent glandular processes. Covered with warty protuberances, increasing in the young growth at the top (N.T.A., 13).

*E. latifolia*, epicotyl long, slight, and covered with transparent, glandular protuberances (Cullen Creek-Woolngi); above the cotyledons covered with transparent glandular hairs (Cullen Creek).

*E. Cliftoniana*, green after the epicotyl, and covered with long white glandular hairs and processes.

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. terminalis*, petiolate, ovate, glabrous, smaller and narrower than the cotyledons; rachis slightly glandular.

*E. dichromophloia*, petiolate, ovate, slightly hairy, longer but narrower than the cotyledons; rachis glandular or hairy.

*E. Watsoniana*, petiole long, lanceolate to ovate, in some specimens not half the size of the cotyledons, slightly hairy; rachis hairy.

*E. setosa*, shortly petiolate, lanceolate to ovate, about as long as the cotyledons, but narrower, hairy.

*E. latifolia*, sessile, broadly ovate, hairy, much smaller than the cotyledons; rachis hairy.

*E. Cliftoniana*, petiolate, ovate, hairy all over, smaller than the cotyledons; rachis glandular to hairy.

(5) *Subsequent Pairs of Leaves* (Number, petiole, shape, vestiture).

*E. terminalis*, eleven or more, ovate, oblong, to oblong-lanceolate, light green, glabrous, petiole very short to short.

*E. dichromophloia*, numerous, still opposite at 12 inches, petioles very short to short, ovate to oblong-lanceolate, slightly hairy, light green, stem hispid.

*E. Watsoniana*, none.

*E. setosa*, at least six pairs, shortly petiolate to sessile, ovate to lanceolate, small hairy, light green, also the stem.

*E. latifolia*, six or more, ovate, shortly petiolate, slightly hairy, light green, stem hairy, green.

*E. Cliftoniana*, five or more, ovate to cordate, conspicuously hairy, petiole short, light green, stem hairy.

(6) *Intermediate Leaves*.

*E. terminalis*, not seen.

*E. dichromophloia*, oblong lanceolate, shortly petiolate, firm, the margins somewhat thickened, venation faint, At 15 inches, 9 cm. long, 2.5 cm. broad, light green.

*E. Watsoniana*, lanceolate, petiole rather long, slightly wavy, thin. venation faint, veins rather distant, 8 cm. long, 2.5 cm. broad, light green, with a very light glaucous tinge. Stem light green, with a few scattered seta.

*E. setosa*, not seen.

*E. latifolia*, not seen.

*E. Cliftoniana*, not seen.

(6a) (Miss Flockton).

*E. dichromophloia.*

*1st leaves* ovate, undersurface paler, prominent glands on edges and back of leaf. *1st alternate leaves*, in the advanced stage, the glands have disappeared from the leaves and stem (Mount House).

*E. Watsoniana.*

*1st leaves* ovate oblong, both surfaces covered with glands, also on edges and midrib, edge red. *1st alternate leaves* ovate-lanceolate, becoming smoother. Purple tint on the back of the leaves when young, and showing through the surface of the very young ones. Glauous. On another seedling the second pair of leaves are oblong in shape and slightly emarginate (Delubra).

*1st leaves* ovate-acute, red at the base and edge, with warty glands. *1st alternate leaves* ovate, paler green on the back, a beautiful pinkish bloom on the upper leaves, venation very delicate, the intramarginal vein lost in the edge of the leaf (Botanic Gardens, Sydney).

*1st leaves* ovate, tinted pink on both sides, edges red, prominent glands all over (Botanic Gardens, Sydney).

*E. setosa.*

*1st leaves* ovate, with glandular processes on the edges and both sides (N.T.A., 45).

*1st leaves*, young growth in the first stage is covered with glandular processes (Woolngi).

*1st leaves* ovate-acute, undersurface paler, with warty glands on the edges, midrib and scattered on the leaves (N.T.A., 13).

*E. latifolia.*

*1st leaves* ovate, warty on the back (Cullen Creek).

*E. Cliftoniana.*

*1st leaves* ovate and ovate-cordate, covered on both sides with white glandular hairs. The epicotyl and very young leaves are covered with long white glandular processes.

## Series 2c.—Eudesmeae.

(a) Broad setose.

*E. eudesmioides.*

*E. tetragona.*

*E. erythrocorys.*

(b) Broad, scarcely setose.

*E. Baileyana.*

(c) Narrow setose.

*E. tetradonta.*

Taking *E. eudesmioides* as a type of this section, the seedlings are setose except *E. Baileyana*. This section is very closely allied to the *Corymbosæ* in the shape, size, colour and vestiture of the leaves, but differs in the non-peltate character of the juvenile leaves.

*General Appearance*.—Broad, elliptical to almost cordate lanceolate, glaucous shading to dark green, relieved by the reddish midrib and sometimes the red margin crenulate-stellate, the surface of the lamina undulate-crinkled. Petioles moderately long, pink. Stems usually reddish, setose. Of this series *E. tetradonta* is distinctly narrow, but it has the setose character and is usually a pale yellowish green.

(1) *Hypocotyl*.

*E. eudesmioides*, long, terete, glabrous.

*E. tetragona*, long, terete, glabrous.

*E. erythrocorys*, long, slender, terete, glabrous.

*E. Baileyana*, medium, slender, terete, slightly glandular.

*E. tetradonta*, very long and slender, terete, glandular.

(1a) *Hypocotyl* (Miss Flockton).

*E. eudesmioides*, red, strong, tall (Minginew).

*E. tetragona*, long, shaded, red (A. 94).

*E. erythrocorys*, crimson (Dongarra).

*E. Baileyana*, does not taper to the root, is covered with glands (8 Mile Plains).

*E. tetradonta*, pink, with a few hairs below the cotyledons (Darwin); terete, thickening a little to the base, green, with a faint tint of pink (Darwin, No. 2).

The only seedling (except *E. dichromophloia*) on which I have found hairs on the hypocotyl and on the petioles of the cotyledons (Darwin, 1004); angular, pink towards base, stellate glands (Darwin).

(2) *Cotyledons* (Petiole, taper).

All five species slightly tapering into the petiole.

(2a) *Cotyledons* (undersurface, Miss Flockton).

*E. eudesmioides*, red (30); deep crimson, trinerved (Minginew).

*E. tetragona*, red (A. 94).

*E. erythrocorys*, purple tint (Dongarra).

*E. Baileyana*, deep crimson, smooth, but the petioles and stem below them have stellate glands (8 Mile Plains).

*E. tetradonta*, stellate glands on the petioles (Darwin); green (Darwin, 1004, also G. F. Hill).

(3) *Stem* (Miss Flockton).

*E. eudesmioides*, red (No. 30); brownish red, to pale-green tinted pink, having a few stellate hairs on the first part until at 6 inches high they are thickly matted (Minginew).

*E. tetragona*, first stage, the short epicotyl and young leaves covered in clear, long, stellate processes. The stem more advanced is thickly matted in stellate hairs and the leaves become a glaucous green (A. 94).

*E. erythrocorys*, crimson, shading to pale green, matted with stellate hairs (Dongarra).

*E. Baileyana*, red, covered with stellate glands above the hypocotyl (8 Mile Plains).

*E. tetrodonta*, green, with glandular hairs (Darwin).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. eudesmioides*, petiole long, opposite (or perhaps occasionally slightly alternate), linear spatulate, the margin prominently stellate, narrower than the cotyledons and about twice their length.

*E. tetragona*, opposite, ovate-lanceolate, nearly sessile, stellate (No. 492); petiole long (the longest of this series), opposite, ovate-lanceolate, slightly undulate, more than three times the size of the cotyledons, prominently stellate, more or less wrinkled (A. 94).

*E. erythrocorys*, petiole long, opposite, oblong, undulate, broader and one and a half times longer than the cotyledons, scabrous, bullate.

*E. Baileyana*, petiole long, opposite, ovate, slightly hairy, about as broad as the cotyledons and slightly longer to twice the length of the cotyledons.

*E. tetrodonta*, petiole long, opposite, linear-lanceolate, margin crenulate with tufts of hairs, narrower than the cotyledon and three times as long.

(5) *Subsequent Pairs of Leaves* (Number petiole, shape, vestiture).

*E. eudesmioides*, one to four, opposite, petiolate, broadly elliptical, margins crenate-dentate, with tufts of hair at the points and rachis very hairy. Venation strongly marked.

*E. tetragona*, three, opposite, petiolate, ovate-lanceolate, sometimes slightly retuse, margins crenulate, with tufts of hairs at the points and rachis very hairy. Venation strongly marked. Light green, shaded glaucous above, glaucous beneath, petioles, midrib and margin purple-brown; stem a rich purple-brown, hirsute.

*E. erythrocorys*, three or more, (?) numerous, petiolate, ovate-lanceolate to cordate, with a tendency to bullate. Margins crenate, hairy. Venation moderately prominent, light green, blotched with a lighter glaucous green. Stem a rich purple-brown, minutely scabrous, stellate.

*E. Baileyana*, one to three or more (opposite at 8 inches), petiolate, ovate-lanceolate to lanceolate cordate, margins entire or slightly serrulate. Stellate hairs abundant on back of leaf. Rachis and midribs scurfy, moss green, petiole and stem a dull purple-brown. Venation distinct.

*E. tetrodonta*, one to four, opposite, petiolate, linear. Margins crenulate-dentate points with tufts of hair. Venation distinct, hairs abundant. A very pale yellowish green; stem very slender, green.

(6) *Intermediate Leaves.*

<i>E. eudesmioides</i>	} Not seen.
<i>E. tetragona</i>	
<i>E. erythrocorys</i>	
<i>E. tetrodonta</i>	

*E. Baileyana*, ovate-lanceolate to lanceolate-cordate, semi-peltate, passing into obliquely cordate at the base, ranging from 7 cm. long, 4 cm. broad, to 9 cm. long, 6 cm. broad, darkish green above, pale and scurfy stellate beneath. In the field the intermediate leaves may be seen on saplings more than 20 feet high, they are readily distinguished from those of other species with which they are associated, by the shape and particularly the pale scabrous undersurface. It is a beautiful species in the sapling stage.

(6a) (Miss Flockton).

*E. eudesmioides.*

*1st leaves* ovate, long petioles (30). Narrow-ovate to ovate and oblong, the edges thickly studded with stellate hairs and a few on both sides of the leaf (Minginew).

*E. tetragona.*

*1st leaves* ovate, undersurface pale green, midrib red, with long stellate hairs also on the edges of a few on the leaf, both sides (A. 94).

*E. erythrocorys.*

*1st leaves* ovate-lanceolate, undersurface pale green, stellate hairs on both sides. This plant is entirely covered with stellate hairs, except the cotyledons (Dongarra).

*E. Baileyana.*

*1st leaves* ovate, undersurface purple and glaucous. *1st alternate leaves* the same but larger. The backs of the leaves are covered with stellate hairs, not quite so much on the upper surface (8 Mile Plains).

*E. tetrodonta.*

*1st leaves* linear or slightly spathulate, irregular edge, with tufts of stellate hairs (Darwin, 1004.)

### Series 2d.—Angophoroideae.

- (a) Long and narrow, glabrous, opposite for at least eight pairs.

*E. Spenceriana*.

*E. tessellaris*.

(*E. Spenceriana* shows affinity to *E. exserta* in the narrow, somewhat pinkish leaves, and to *E. decorticans*, see 3.)

- (b) Short and broad, setose, soon alternate.

*E. grandifolia*.

*General Appearance*.—It is convenient to separate the species of this section into two series, viz., narrow and broad—

- (a) *Narrow Series*.—Slender, more or less graceful to somewhat rigid, linear-lanceolate to narrow-lanceolate, firm, shortly petiolate, light green, tinged with yellow, glabrous.

- (b) *Broad Series*.—Small setose, especially the stems, ovate to elliptical in the early stage, passing into lanceolate sessile in the intermediate stage, glaucous to yellowish-green. The species of this series are strongly reminiscent of the *Corymbosæ* in every character, except that they are, like the *Eudesmeæ* non-peltate.

- (1) *Hypocotyl*.

*E. Spenceriana*, absent or very short. Below the surface of the ground-line.

Cf. *E. marginata*.

*E. tessellaris*, short.

*E. grandifolia*, very short.

- (1a) *Hypocotyl* (Miss Flockton.)

*E. tessellaris*, very short, tinted pink (Rockhampton).

*E. grandifolia*, in the very young seedlings, is below the ground, as in *E. marginata*.

When more advanced, is terete, pale green, with scattered glands.

- (2) *Cotyledons* (Petiole, taper).

*E. Spenceriana*, long, slightly.

*E. tessellaris*, very short.

*E. grandifolia*, long slightly.

- (2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Spenceriana*, green (Stapleton).

*E. tessellaris*, green (Rockhampton).

*E. grandifolia*, pale green, upper surface bright yellow-green (Stapleton).

(3) *Stem* (Miss Flockton).

*E. tessellaris*, shaded purplish red, terete, with a few scattered glandular hairs. Epicotyl and young growth with prominent warty glands (Rockhampton).

*E. grandifolia*, epicotyl long, slight, and covered with transparent glandular processes (Stapleton).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Spenceriana*, very short or absent, linear, tapering, glabrous.

*E. tessellaris*, short, ovate, glabrous.

*E. grandifolia*, short, elliptical, slightly hairy.

(5) *Subsequent Pairs of Leaves* (Number, petiole, shape, vestiture).

*E. Spenceriana*, eight or more, linear-lanceolate, glabrous.

*E. tessellaris*, indefinite, lanceolate to linear-lanceolate, glabrous.

*E. grandifolia*, four, ovate-lanceolate, hairy.

(6) *Intermediate Leaves*.

Not seen.

## (6a) (Miss Flockton).

*E. tessellaris*.

*1st leaves* ovate to ovate-lanceolate, undersurface paler green (Rockhampton).

**Series 2e.—Sessile, ovate to lanceolate.**

*E. diversifolia*.

*E. Jacksoni*.

*E. pachyloma*.

*E. patens*.

*E. megacarpa*.

(The sessile character connects this series with the *E. amygdalina* series.  
Small cotyledons, No. 3f.)

*General Appearance*.—Leaves short and broad, sessile to slightly stem-clasping, oblong, ovate to elliptical lanceolate, very faintly stellate or quite glabrous, light to dark green, or moss green, veins moderately distinct. Stems green or reddish.

The proposed grouping of certain Western Australian (chiefly) species is only a tentative one, as the general characters are not constant throughout the series. Perhaps *E. pachyloma* should be placed nearer *E. alpina*, and *E. Jacksoni* and *E. patens* made into a separate series. The only characters that they are constant in is that they are sessile and broad. But we are dealing with but few species.



(1) *Hypocotyl*.*E. diversifolia*, long.*E. pachyloma*, long.*E. Jacksoni*, medium.*E. patens*, medium.*E. megacarpa*, long.(1a) *Hypocotyl*. (Miss Flockton).*E. diversifolia*, red (Thistle Island); deep red, terete (Thistle Island); red, inclined to be angular (Wanilla).*E. pachyloma*, red (W.A. 584, &c.); long, red and with warty glands (Kalgan Plains); terete, red (Kalgan Plains, 10X.).*E. Jacksoni*, crimson (846).*E. patens*, terete, red, smooth (Busselton, also A. Murphy); crimson (39).*E. megacarpa*, thick, red (A. 87); terete, red (Donovan); tapering to the root, red tint (Karridale).(2) *Cotyledons* (Petiole, taper, venation).*E. diversifolia*, short, slightly tapering, triplinerved.*E. pachyloma*, short, slightly tapering.*E. Jacksoni*, short, slightly tapering, triplinerved.*E. patens*, short, slightly tapering, triplinerved.*E. megacarpa*, short, slightly tapering, triplinerved.(2a) *Cotyledons* (Undersurface, Miss Flockton).*E. diversifolia*, red (Thistle Island); purplish red, trinerved (Thistle Island); slight tint of purple (Wanilla).*E. pachyloma*, red (584), &c.); tinted purple, trinerved (Kalgan Plains); variable purple tint (Kalgan Plains).*E. Jacksoni*, purple (846).*E. patens*, green (Busselton); pale mauve (A. Murphy).*E. megacarpa*, deep crimson, petiole short (Karridale); purple (Donovan).(3) *Stem* (Miss Flockton).*E. diversifolia*, with pink shade and with warty glands above the cotyledons (Thistle Island); terete, covered with warty glands (Thistle Island); terete, shaded red, rather prominent glands (Wanilla).

*E. pachyloma*, brownish purple, warty glands (584); red, terete, covered with prominent warty glands (Kalgan Plains).

*E. Jacksoni*, smooth, round, tinted pink (846).

*E. patens*, terete, shaded purple, covered with prominent warty glands (Busselton); thick round. pale yellow-green, tinted pink (39).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. diversifolia*, sessile, oblong, glabrous.

*E. pachyloma*, sessile, oblong-lanceolate, glabrous.

*E. Jacksoni*, sessile, oblong-lanceolate, glabrous.

*E. patens*, sessile, oblong-lanceolate, glabrous.

*E. megacarpa*, sessile, oblong-lanceolate, glabrous.

5) *Subsequent Pairs of Leaves* (Number, petiole, shape, vestiture).

*E. diversifolia*, four or more, oblong to oblong-lanceolate, slightly undulate, sessile, but not lobed at base, glandular, especially on rachis, venation not specially distinct.

*E. pachyloma*, numerous, oblong elliptical to oblong-lanceolate, slightly lobed at base, sessile up to 5 (?) pairs, then petiolate, glabrous, rachis minutely hairy, venation moderately distinct.

*E. Jacksoni*, six or more, ovoid to broadly-elliptical, sessile, margins crenulate, glabrous, venation prominent.

*E. patens*, numerous, oblong to oblong-lanceolate, venation prominent, sessile, slightly lobed at base, the lobing also seen in the alternate stage, glabrous.

*E. megacarpa*, numerous, oblong to oblong-lanceolate and elliptical, sessile up to 4 (?) pairs and then petiolate. No lobing, glabrous, venation moderately prominent.

(6) *Intermediate Leaves*.

*E. diversifolia*, leaves lanceolate, slightly undulate, ending in a thin acuminate point, 8 cm. long, 3.5 cm. broad, light green, petiole short (Thistle Island).

*E. pachyloma*, leaves lanceolate, thickish, rather rigid, veins prominent, 5 to 8 cm. long, 1.5 to 2 cm. broad, light green, tinged with yellowish-green, and also slightly shaded glaucous; petiole very short to medium (Kalgan Plains).

*E. Jacksoni*, leaves broad-lanceolate, undulate, thin, veins obscure, 7 cm. long, 3 cm. broad, light green; petiole short (S. W. Jackson).

*E. patens*, leaves broad ovate to broadly oblong-lanceolate, slightly hastate to quite plain, rather thin, undulate, veins distinct, intramarginal vein distant from the edge, 7 to 12 cm. long, 4 to 5.5 cm. broad, light green, or more or less mottled with a darker shade of green; petiole short to medium (Murphy).

*E. megacarpa*, leaves broadly ovate to broad-lanceolate, thin, undulate, usually terminating in a short thickish mucro, veins obscure, the intramarginal vein undulate, rather distant from the edge, 7 to 9 cm. long, about 5.5 cm. broad, dark green, petiole long (Karridale).

(6a) (Miss Flockton).

*E. diversifolia*.

*1st leaves* ovate or oval. *1st alternate leaves*, plant 15 inches high, leaves still opposite (Thistle Island).

*1st leaves* oval, sessile, undersurface pale green (Thistle Island).

*1st leaves* ovate, sessile. *Leaves* ovate, ovate-lanceolate, stem-clasping (almost sagittate), undersurface paler, appressed (Wanilla).

*E. pachyloma*.

*1st leaves* large ovate, stem-clasping, decussate, undulate, the edge finely toothed, the midrib red. *1st alternate leaves* lanceolate, willowy (584).

*1st leaves* ovate, sessile, midrib, and undersurface pale opaque green (Kalgan Plains).

*1st leaves* ovate, decussate, sessile. The midrib at the back sometimes tinted purple. *Leaves* still opposite, narrow-ovate, tapering at the base. The same colour on both sides, becoming shortly petiolate about the eighth pair of leaves. Leaf thick (Kalgan Plains).

*E. Jacksoni*.

*1st leaves* ovate, stem-clasping, decussate. *1st alternate leaves* ovate, acute, petiolate, undersurface pale glaucous green (846).

*E. patens*.

*1st leaves* ovate, short petioles, second leaves and after, oblong sessile and sometimes sinuous (Busselton).

*1st leaves* ovate, stem-clasping, decussate (39).

*1st leaves* broadly ovate, undulate (A. Murphy).

*E. megacarpa*.

*1st leaves* ovate or lanceolate, sessile, red midrib and undersurface, with pink-tinted venation (Donovan).

*1st leaves* elliptical, sessile, a little red venation, undersurface pale green. *1st alternate leaves* elliptical,  $3\frac{1}{2}$  inches long, petioles (Karridale).

## Series 2f.—Rigid semi-angular.

*E. tetraptera*.

*General Appearance*.—Somewhat robust, rigid, semi-quadrangular, leaves short, oblong to obtuse lanceolate, thick, only the first pair opposite, somewhat glaucous the midrib slightly tinged with purple-brown. Stem purple-brown, inclined to be angular as it develops.

In the early stage, say, up to 7 inches, the affinity of this seedling approaches that of *E. angulosa*, especially in the leaves, becoming alternate after the first or second pair. Its rigid nature is also a feature of the *E. angulosa* series.

(1) *Hypocotyl*.

Very long.

(1a) *Hypocotyl* (Miss Flockton).

Red.

(2) *Cotyledon* (Petiole, taper).

Long, tapering.

(2a) *Cotyledon* (Undersurface, Miss Flockton).

Red.

(3) *Stem* (Miss Flockton).

Purple red.

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

Petiolate, lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves*.

None.

(6) *Intermediate Leaves*.

Not seen.

(6a) (Miss Flockton).

*1st leaves* lanceolate or ovate-acute, red all over the back. *1st alternate leaves* large ( $2\frac{3}{4}$  inches long). ovate-lanceolate.

## DIVISION RENIFORMAE.

### Section 3.—Small Cotyledons.

3A. CRINKLED SERIES (*i.e.*, the leaves crinkled or bullate).

*E. eugenioides.*

*E. Baxlandi.*

*E. agglomerata.*

*E. capitellata.*

*E. Baxteri.*

3B. STELLATE, SUB-CRINKLED SERIES (*i.e.*, with hairs stellate and much less crinkled than 3B; also has affinity with some members of the Corymbosæ.

*E. ligustrina* (leaves small).

*E. alpina.*

*E. Camfieldi.*

*E. Preissiana* (not *Renantheræ*).

3C. FUCHSIA SERIES (because the seedlings more or less remind one of the foliage of the common garden Fuchsia. Its affinities are with Nos. 3A and 3D.).

*E. regnans.*

*E. Laseroni.*

*E. fastigata.*

*E. macrorrhyncha.*

*E. laevopinea.*

*E. Muelleriana.*

*E. microcorys.*

*E. leptophleba* (not *Renantheræ*).

3D. OBLIQUA SERIES (because the oblique leaves are reminiscent of those of *E. obliqua*. It has affinity to No. 3C and also, in the alternate stage, to No. 3I.

*E. obliqua.*

*E. Penrithensis.*

*E. Andrewsii.*

3E. ACMENIOIDES SERIES (named from the best known species of the series. In Nos. 3E to 3H, the sessile opposite character of the young leaves is well marked).

*E. acmenioides.*

*E. umbra.*

3F. AMYGDALINA SERIES (named from the best known species of the series).

*E. linearis.*

*E. numerosa.*

*E. amygdalina.*

*E. radiata.*

3G. GLAUOUS, SESSILE SERIES (named from prominent characters; this series connects with *E. cordata*, &c. (Bilobæ Series—see next Part).

*E. Smithii* (subglaucous).

*E. coccifera.*

*E. dives.*

*E. dives* connects with *E. piperita* (No. 3H.).

3H. SIEBERIANA SERIES (semiglaucous). (Named after a prominent member of the Series, the members of which are semiglaucous). (*E. piperita* connects with No. 3E.).

*E. taeniola.*

*E. Simmondsii.*

*E. Consideniana.*

*E. Sieberiana.*

*E. pilularis* (close to *E. Simmondsii*  
in one stage).

*E. piperita* (the broadest).

3I. GLAUCOUS, BROAD, RIGID SERIES (a descriptive title). Nos. 3I and 3J, and these and 3K and 3M are closely related. The series has also affinity to No. 3D).

*E. virgata.*

*E. gigantea.*

*E. oreades.*

3J. SUBGLAUCOUS SERIES (closely related to Series 3I).

*E. micrantha.*

*E. hæmastoma.*

3K. INTERMEDIATE RIGID SERIES.

*E. stricta.*

*E. fraxinoides.*

*E. obtusiflora.*

3M. NARROW RIGID SERIES.

*E. nitida.*

*E. approximans.*

*E. Mitchelliana.*

*E. Kybeanensis.*

*E. apiculata.*

3N. NARROW LONGITUDINAL SERIES.

*E. Moorei.*

*E. vitrea.*

3P. BROAD LONGITUDINAL SERIES (*i.e.*, elliptical to cordate).

*E. coriacea.*

*E. stellulata.*

*E. de Beuzevillei.*

### 3a.—Crinkled Series.

*E. eugeniioides.*

*E. Blaxlandi.*

*E. agglomerata.*

*E. capitellata.*

*E. Baxteri.*

*General Appearance.*—Leaves crinkled or markedly undulate, somewhat rough, stellate, usually lanceolate, or medium-sized. rarely beyond 6 cm. long, dark to metallic green, sometimes turning to purple-brown; veins prominent. Stems usually densely but softly stellate tomentose, except when growing under harsh conditions; pale purple-brown.

(1a) *Hypocotyl* (Miss Flockton).

- E. eugenoides*, terete, tinted red at the base (Mount Victoria).  
*E. agglomerata*, terete, ribbed, red (Outer Domain); smooth, red (Wingello).  
*E. Baxteri*, terete, red (Kangaroo Island).  
*E. Blaxlandi*, terete, red (Blackheath).  
*E. capitellata*, terete, red (Sutherland).

(2) *Cotyledons* (Petiole, taper).

Petioles in all cases short to medium, slightly tapering, and venation obscure.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

- E. eugenoides*, purple-red (Mount Victoria); deep crimson (Gosford).  
*E. agglomerata*, deep crimson (Outer Domain); crimson (Wingello).  
*E. Baxteri*, green to purple-brown (Kangaroo Island).  
*E. Blaxlandi*, rich puce (Blackheath).  
*E. capitellata*, purple red (Sutherland).

(3) *Stem*.

*E. eugenoides*, above the hypocotyl terete, red, and with stellate hairs (Mount Victoria).

*E. agglomerata*, terete, deep crimson, and with small stellate glands (Outer Domain).

*E. Baxteri*, terete to slightly compressed, reddish, minutely stellate hairs.

(4) *1st Pair of Leaves* (Shape, vestiture).

In all four species, lanceolate; rachis minutely hairy.

## (4a) (Petiole).

- E. eugenoides*, *E. agglomerata* and *E. Blaxlandi*, medium.  
*E. capitellata*, short to medium.

(5) *Subsequent Pairs of Leaves* (Number, petiole).

- E. eugenoides*, three to six pairs.  
*E. agglomerata*, two pairs or more.  
*E. Baxteri*, three pairs or more, sessile to petiolate.  
*E. Blaxlandi*, four pairs or more.  
*E. capitellata*, three pairs or more.

Petioles in each case short to very short, or wanting.

## (5a) (Shape, vestiture).

*E. eugenoides*, narrow- to broad-lanceolate, markedly undulate; inflexed, margins runcinate. Copiously hairy, shortly setose. Rachis greenish-brown to rich purple-brown and densely setose. These rachis-characters pass to the midribs and to the young tips, until they reach the intermediate stage, when the leaves are glabrous and green. The general appearance of the seedling is dark green blotched with red.

*E. agglomerata*, oblong to lanceolate; margins slightly undulate or crinkled; softly hairy. The general appearance of the leaf is paler than *E. eugenoides*, viz., dull pale green, and softly hairy. Rachis slightly hoary, but showing a reddish-pink tinge.

*E. Baxteri*, ovate, sessile, sinuous, covered in stellate hairs; at  $5\frac{1}{2}$  inches, 5.5 cm. long, 3 cm. broad.

*E. Blaxlandi*, lanceolate to broad-lanceolate; undulate margins; copiously, but softly stellate-hairy. Colour and vestiture of rachis as in *E. agglomerata*.

*E. capitellata*, oblong to broad-lanceolate, slightly undulate; margins slightly denticulate, and almost runcinate, slightly hairy. Rachis reddish-pink, and shortly, but densely, hairy. In general appearance this is the most entire-leaved of the four.

## (6) Intermediate Leaves.

*E. eugenoides*, lanceolate, shortly petiolate, crinkled-undulate to nearly flat, denticulate, densely stellate; at 17 inches, 7 cm. long, 2 cm. broad; at 21 inches, 6 cm. long, 2.5 cm. broad. Light green, shading to purple-brown. Stem stellate or hispid-stellate.

*E. agglomerata*, broad ovate, shortly petiolate, crinkled, the margins softly stellate-tomentose; at 8 inches, 7 cm. long, 4 cm. broad, dark green, tinged with purple-brown, the young tips and twigs downy-stellate; at 12 inches, 7 cm. long, 4 cm. broad; broadly and obliquely lanceolate, slightly undulate, very shortly petiolate, pale green. Stem stellate-tomentose, hoary-purple (Nelligen to Reidsdale).

*E. Baxteri*, elliptical to almost cordate, sessile, undulate, hispid to broadly and obliquely oblong, retuse, or with a small mucro in the centre of the notch, petiolate, thick, smooth and shining, varying from yellowish to glaucous green; midrib and stem a rich purple-brown. At 12 inches high 6-7 cm. long, 4.5 to 5 cm. broad (Kangaroo Island).

*E. Blaxlandi*, lanceolate to oblong-lanceolate, shortly petiolate, crinkled undulate; margins purplish or purple brown, up to 12 inches or more, then changing to smooth at  $22\frac{1}{2}$  inches; oblong to obliquely oblong-lanceolate, mucronate, rigid, 7 cm. long, 3 cm. broad pale green, shading to yellowish green. Stem up to 12 inches or more, slightly stellate-tomentose, dull purple-brown at  $22\frac{1}{2}$  inches; smooth, reddish-purple shaded green (Blackheath).



*E. capitellata*, oblong-lanceolate to lanceolate, shortly petiolate, undulate, hispid-stellate to smooth or glandular-rugose; at 6 inches, 6 cm. long, 3 cm. broad. After this stage they change to broad-lanceolate, more or less oblique, pale green throughout. Stem at first stellate-tomentose, pale purple-brown, changing to glandular rugose, green, tinged with pale purple-brown (Wyee).

(6a) (Miss Flockton).

*E. eugenioides*.

*1st leaves* lanceolate to ovate, petiolate, the edges are sometimes thickly fringed with stellate hairs and sometimes without any; decussate. *1st alternate leaves* ovate-lanceolate, much crinkled, edges red, shortly petiolate, under-surface paler green, edges, back of midrib and petiole dotted with stellate glands, decussate, 5 inches high and branching from first pair of leaves (Mount Victoria).

*E. agglomerata*.

*1st leaves* ovate, petiolate, short, tinted crimson purple, with some stellate glands on the edges. *Other leaves* ovate lanceolate, petiolate, thick, undersurface paler green, becoming alternate at about 15 inches high (Outer Domain).

### 3b.—Stellate, sub-crinkled Series.

*E. ligustrina*.

*E. alpina*.

*E. Camfieldi*.

*E. Preissiana*.

*General Appearance*.—Short and broad, obtuse to shortly acute, ovate to elliptical-lanceolate, more or less undulate, bullate in *E. alpina* and to some extent in *E. Preissiana*, dark to yellowish green, veins prominent. Sessile to very shortly petiolate. Stems green or pale pink, more or less slightly stellate.

(1) *Hypocotyl*. All medium except *E. Preissiana*, which is long.

(1a) (Miss Flockton).

*E. ligustrina*, terete, smooth, red (Wentworth Falls).

*E. Preissiana*, red (Hobart, cultivated, 33); terete, red (Hobart, cultivated); shaded pink, smooth (Kalgan Plains).

*E. alpina*, terete, red (Tetanga); terete, red, smooth and shiny (St. John).

(2) *Cotyledon* (Petiole, taper).*E. ligustrina*, petiole very short, cotyledon slightly tapering.*E. Camfieldi*, medium, slightly tapering.*E. alpina*, short, tapering.*E. Preissiana*, long, tapering.(2a) *Cotyledon* (Undersurface, Miss Flockton).*E. alpina*, red tint (Tetanga); tinted puce (St. John).*E. Preissiana*, red, trinerved (Hobart, cultivated, 33); red (Hobart); slight tint of purple (Kalgan Plains).(3) *Stem* (Miss Flockton).*E. ligustrina*, red, terete, covered with fine stellate hairs (Wentworth Falls).*E. alpina*, terete, green, covered with stellate hairs (Tetanga); terete, smooth, shaded red (St. John).*E. Preissiana*, tinted red (Hobart, cultivated, 33); shaded red, terete, a little flattened, stellate hairs increasing towards the top of the plant and young growth (Kalgan Plains).(4) *1st Pair of Leaves* (Shape, vestiture).*E. ligustrina*, leaves ovate to ovate-lanceolate (?) no hairs; rachis smooth, purple brown.*E. Camfieldi*, leaves lanceolate; (?) no hairs except on rachis, which is slightly hairy and purple brown.*E. alpina*, leaves ovate and slightly hairy; rachis hairy, purple brown.*E. Preissiana*, leaves sessile and oblong-lanceolate, slightly hoary; rachis hairy.(4a) *Petiole*.*E. ligustrina*, very short.*E. Camfieldi*, short.*E. alpina*, very short.(5) *Subsequent Pairs of Leaves* (Number, petiole).*E. ligustrina*, three, petiole very short.*E. Camfieldi*, two or more, petiole short.*E. alpina*, two or more, very short to sessile, stem-clasping.*E. Preissiana*, four (or more).

## (5a) (Shape, vestiture).

*E. ligustrina*, ovate to lanceolate, glabrous.*E. Camfieldi*, lanceolate to cordate, the margins alone slightly hairy.*E. alpina*, oblong to cordate, bullate, hispid all over.*E. Preissiana*, oblong-lanceolate to broadly-ovate, undulate, slightly lobed almost amplexicaul, hairy, especially on margins and rachis. Venation prominent.

(6) *Intermediate Leaves.*

*E. ligustrina.* Leaves ovate-lanceolate, changing to oblong lanceolate, hispid, slightly undulate to quite flat, dark green, veins obscure; at 18 inches, 2–3 cm. long, 1 cm. broad; light green; petiole very short; stem minutely stellate, hispid (Wentworth Falls).

*E. Camfieldi.* Leaves cordate to obliquely cordate, hispid, margins crinkled undulate, pale and dull beneath, shining above; shortly petiolate, ranging from 2.5 cm. to 4.5 cm. long, and from 2 cm. to 4 cm. broad, then changing to obliquely oblong, mucronate, thick and shining, ranging from 6 to 8.5 cm. long and 5 cm. broad; petiole long; stem stellate, hispid (Hornsby).

*E. alpina.* Leaves orbicular emarginate, thick, more or less venulose; petiole thick, rather long; at 21 inches, 5 cm. long, 4.5 cm. broad; dark green throughout; stem hispid (Mr. St. John, Victoria).

*E. Preissiana.* Leaves oblong to oblong lanceolate, firm to slightly undulate, thick, shortly petiolate; at 9½ inches 6.5 cm. long, 4 cm. broad; light green, margins and midrib reddish purple. (Kalgan Plains).

(6a) (Miss Flockton).

*E. ligustrina.*

*1st leaves* ovate, undersurface tinted purple, scattered stellate hairs on the edges (Wentworth Falls).

*E. alpina.*

*1st leaves* ovate, shortly petiolate, later sessile and stem-clasping; edge and surface covered with stellate glands, venation deeply grooved (Tetanga).

*1st leaves* exceedingly small and spathulate. *Leaves* later lanceolate, finely pointed, and tapering into a short petiole at the base. Midrib sometimes red at the back, the leaf slightly paler green, venation very delicate. The seedling at 6½ inches is a sturdy little plant (St. John).

*E. Preissiana.*

*1st leaves* broadly ovate or oval, opposite, sessile, shiny (Hobart, cultivated, 33).

*1st leaves* ovate, sessile, stem-clasping, a few stellate hairs on edges and midrib; later, large ovate, undulate, stem-clasping, more hairs, red midrib (Kalgan Plains).

**3c.—Fuchsia Series.**

*E. regnans.*

*E. fastigata.*

*E. laevopinea.*

*E. Laseroni.*

*E. macrorrhyncha.*

*E. Muelleriana.*

*E. leptophleba.*

*E. microcorys.*

*General Appearance.*—Leaves usually lanceolate, moderately broad, slightly undulate, the margins dentate-stellate, usually shortly petiolate, light to dark green, tinged with madder-lake, especially the young tips. Stems slightly stellate-tomentose

to glabrous, pink or various shades of purple-brown. The general appearance of some of the seedlings, in the alternate-leaves stage, is undoubtedly reminiscent of the foliage of the commonly cultivated Fuchsia.

(1) *Hypocotyl*.

- E. regnans*, short to long.
- E. fastigata*, short to long.
- E. laevopinea*, short to medium.
- E. Laseroni*, short to medium.
- E. macrorrhyncha*, short.
- E. Muelleriana*, short to long.
- E. leptophleba*, medium.
- E. microcorys*, long.

(1a) (Miss Flockton).

*E. regnans*, ribbed with a few glands, red, epicotyl terete, with stellate glands. (St. John).

*E. fastigata*, terete, red (Sunny Corner); red, somewhat angular, warty glands near cotyledons (Marulan).

*E. laevopinea*, terete, red (Nundle).

*E. Laseroni*, smooth, deep red (Hanging Rock, Nundle).

*E. macrorrhyncha*, terete, smooth, red brown (Macnally Ranges, Cooma); smooth, red (Hassan's Walls); smooth, red (Dubbo); short, deep red (Nundle); terete, red, sturdy (Stanthorpe).

*E. Muelleriana*, terete, red (Wingello); smooth, red (Wingello, No. 2).

*E. leptophleba*, ribbed, stained red (Stannary Hills).

(2) *Cotyledons* (Petiole, taper, venation).

- E. regnans*, short to medium, tapering.
- E. fastigata*, medium, tapering.
- E. laevopinea*, medium, tapering; obscurely trinerved.
- E. Laseroni*, short.
- E. macrorrhyncha*, medium, tapering.
- E. Muelleriana*, medium, tapering.
- E. leptophleba*, medium, tapering.
- E. microcorys*, long, scarcely tapering.

## (2a) (Undersurface, Miss Flockton).

*E. regnans*, green.

*E. fastigata*, mauve (Sunny Corner); purple red (Marulan); red (Tarana).

*E. laevopinea*, red (Nundle).

*E. Laseroni*, deep crimson (Hanging Rock, Nundle).

*E. macrorrhyncha*, pink shade (Cooma); crimson when young, showing stellate hairs (Hassan's Walls); red (Dubbo); deep crimson (Nundle and Stanthorpe).

*E. Muelleriana*, purple (Wingello); crimson (Wingello, No. 2).

*E. leptophleba*, purple-red (Stannary Hills).

(3) *Stem* (Miss Flockton).

*E. fastigata*, terete, covered in prominent glands, stellate (Sunny Corner); loses the pink tinge after the second leaves; covered in prominent warty processes (Marulan); faint pink tinge (Tarana).

*E. Laseroni*, thickly matted with stellate hairs (Hanging Rock, Nundle).

*E. macrorrhyncha*, terete, glaucous pink, covered with a mat of stellate hairs (Cooma); shaded purple, terete, covered with stellate hairs (Hassan's Walls); thickly covered with stellate hairs (Dubbo); terete, red, covered with transparent hairs, some terete (Stanthorpe).

*E. Muelleriana*, terete, shaded red, covered with stellate glands (Wingello); above the cotyledons with very small stellate glands (Wingello, No. 2).

*E. leptophleba*, thickly covered with stellate hairs (Stannary Hills).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. regnans*, Short narrow-lanceolate, slightly hispid, rachis slightly hispid, purple-brown.

*E. fastigata*, short, lanceolate, slightly hispid, rachis slightly hispid, green to purple-brown.

*E. laevopinea*, short, lanceolate, minutely hairy, rachis minutely glandular, purple-brown.

*E. Laseroni*, short, lanceolate, slightly hispid, rachis slightly hispid, purple-brown.

*E. macrorrhyncha*, short, narrow-lanceolate to ovate, slightly hairy, rachis glandular, purple-brown.

*E. Muelleriana*, short, lanceolate, rachis slightly hispid, green to purple-brown.

*E. leptophleba*, short, lanceolate, slightly hispid, rachis slightly hispid, purple-brown.

*E. microcorys*, short, linear-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, petiole, shape, vestiture).

*E. regnans*, two, lanceolate, margins minutely denticulate, slightly spreading, but tending to be appressed.

*E. fastigata*, two, lanceolate, denticulate, *i.e.*, Fuchsia-like.

*E. laevopinea*, two or more, lanceolate, margins slightly hairy.

*E. Laseroni*, two or more, ovate to broad-lanceolate, margins slightly denticulate.

*E. macrorrhyncha*, two, oblong to oblong-lanceolate, slightly hairy, margins serrulate.

*E. Muelleriana*, three or more, lanceolate, sessile to nearly stem-clasping, margins slightly wavy.

*E. leptophleba*, two or more, broadly lanceolate to nearly ovate, margins slightly hairy.

*E. microcorys*, four or more, narrow-lanceolate, petiolate, dark green, glabrous.

(6) *Intermediate Leaves*.

*E. regnans*. Leaves obliquely lanceolate, undulate, slightly rugose above, the margins sometimes distantly and irregularly dentate, the apex short or acuminate; veins scarcely prominent, few and distant, somewhat longitudinal, 8 cm. long, 3 cm. broad; light to dark green, shaded yellowish-green, with a very light tinge of glaucousness; stem purple-brown, glandular, rugose. (Victoria, from Mr. St. John).

*E. fastigata*. Leaves lanceolate or acuminate lanceolate, more or less undulate, pale on the lower surface; veins obscure above, more prominent beneath, not numerous, semi-longitudinal; 7-8 cm. long, 2-3 cm. broad; dark to pale green; petiole short to medium; stem a light purple-brown, slightly glandular. (Brindabella Mountain, Coree, Queanbeyan, R. H. Cambage).

*E. laevopinea*. Leaves broad lanceolate to broad lanceolate falcate, slightly oblique; veins obscure, the intramarginal vein undulate and distant from the edge; 8 to 13 cm. long, 3 to 4 cm. broad; light to dark green, tinged with yellowish-green and dull purple-brown; petiole very short; stem a dull purple-brown, shaded green (Nundle, Forestry Commission).

*E. Laseroni.* Leaves broad lanceolate, the margins slightly denticulate, deflexed, the lamina slightly turned upwards; veins obscure, 5 cm. long, 3 cm. broad; dark green; the margin and midrib purple-brown; petiole very short (Hanging Rock, Nundle, J.H.M. and J.L.B.).

*E. macrorrhyncha.* Leaves oblong to lanceolate, firm to undulate, the margin obscurely denticulate to entire and strongly nerved; veins obscure; 7 to 8 cm. long, 2-5 cm. broad; light green with a purple-brown tinge; petiole short; stem pale purple-brown. The material not satisfactory (Blackman's Crown, Capertee, J. B. Yeo).

*E. Muelleriana.* Leaves long-lanceolate or attenuate-lanceolate, slightly undulate; veins more or less distinct; dark green on the upper surface, much paler on the lower, 9 to 13 cm. long, 3 to 3.5 cm. broad; dark green mottled with yellowish-green; petiole very short; stem purple-brown tinged with green. (Victoria, A. W. Howitt).

*E. leptophleba.* Leaves elliptical to lanceolate, the purple margin minutely denticulate; veins obscure, midrib purple-brown, 6 cm. long, 2.5 cm. broad; light green shaded yellowish-green and a very dull purple-brown; stem a rich purple-brown (Stannary Hills, Dr. T. L. Bancroft).

*E. microcorys.* Leaves broadly lanceolate to elliptical, petiolate, the lateral veins reddish and subcanaliculate above (Wollambine, New South Wales, Andrew Murphy).

(6a) (Miss Flockton).

*E. regnans.*

*1st leaves* ovate, undersurface pale green (St. John). *Leaves* ovate-acute, with some edges crinkled and red. Shortly petiolate, undersurface paler green, decussate (St. John).

*E. fastigata.*

*1st leaves* ovate acuminate, undersurface slight mauve tint, a few glands on the edges (Sunny Corner).

*1st leaves* ovate, undersurface purple tint. *1st alternate leaves* ovate-lanceolate, a few glands on the edges of the leaves (Marulan).

*1st leaves* ovate-acute. *1st alternate leaves* the same but larger.

*E. Laseroni.*

*1st leaves* ovate, shortly pedunculate, undersurface tinted mauve, stellate hairs on the edges and midrib. *1st alternate leaves* ovate-lanceolate, acuminate, subcordate base, edges red with prominent glands; undersurface pale bright green (Nundle).

*E. macrorrhyncha.*

*1st leaves* ovate, a few stellate hairs, later ovate or oblong, the edges and both sides of leaves with stellate hairs. *1st alternate leaves* ovate-acute, red petioles, losing the warty glands (Cooma).

*1st leaves* ovate, short peduncle, stellate hairs on edge, later, the same but larger and ovate-acute (Hassan's Walls).

*1st leaves* elliptical, tinted red on the back and edges, with stellate hairs on the edge and petiole. *1st alternate leaves*, the same but larger, and losing the red tint. The midrib and leaves also have scattered stellate hairs in the early stages (Dubbo).

*1st leaves* ovate, stiff, almost sessile, underside shaded pink, a few stellate hairs on the edges, decurrent (Stanthorpe).

*E. Muelleriana.*

*1st leaves* ovate, petiole short, undersurface pale green. *Leaves* ovate-lanceolate, stem-clasping, stellate glands on back of midrib and edges, undersurface paler green (Wingello).

*1st leaves* ovate, with fine stellate glands on edges and midrib and sometimes faint purple shade (Wingello).

*E. leptophleba.*

*1st leaves* ovate (leaves and young growth covered in stellate hairs). Purple shade on the back. *1st alternate leaves* ovate-lanceolate, red edges and midrib, shiny, pale undersurface; stellate hairs on the edges. The plant in the second stage is thickly covered with stellate hairs on the stem, edges of leaves and young leaves.

### 3d.—Obliqua Series.

*E. obliqua.*

*E. Andrewsii.*

*E. Penrithensis.* (The affinity of this species to the two former is very close in the early stage, say, up to 6 inches in height. The intermediate stage is, however, much narrower.)

*General Appearance.*—In the early stages the leaves are oblong-lanceolate to lanceolate, glaucous green shading to darker green; sometimes the tip turns to purple-brown; margins undulate, shortly petiolate, somewhat glandular, but scarcely hispid, rarely exceeding 7 cm. in length. Stems green or reddish, minutely glandular. Intermediate leaves oblique, broadly lanceolate, dark shading to lighter green, the midrib and rachis purple-brown, usually 10–12 cm. at 24 inches high.

(1) *Hypocotyl.*

*E. obliqua*, medium to long.

*E. Andrewsii*, medium to long.

*E. Penrithensis*, medium.



(1a) *Hypocotyl* (Miss Flockton).

*E. obliqua*, tinted red (Wingello); shaded red, angular (Wingello, No. 2); terete, wiry, red (Kuitpo).

*E. Andrewsii*, terete, red (Howell and Wallangarra); terete, tinted red (Narrabri); short, smooth, tinted red (Narrabri, No. 2).

*E. Penrithensis*, terete, red (Toongabbie); terete, wiry red (Galston Road); terete, red, bending over, the epicotyl with stellate glands (Galston Road).

(2) *Cotyledons* (Petiole and taper).

*E. obliqua*, medium, tapering.

*E. Andrewsii*, medium to long, tapering.

*E. Penrithensis*, medium, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. obliqua*, faint mauve tint (Wingello); sometimes purple (Wingello, No. 2); green or pale puce (Kuitpo).

*E. Andrewsii*, purple red (Howell); deep crimson (Narrabri); crimson (Wallangarra).

*E. Penrithensis*, tinted red (Toongabbie); rich puce (Galston Road).

(3) *Stem* (Miss Flockton).

*E. obliqua*, covered with pink, prominent warty glands (Wingello); warty glands above the cotyledons (Wingello, No. 2); terete, shaded red (Kuitpo).

*E. Andrewsii*, young, terete, red, thickly covered with warty glands (Howell); terete, shaded red (Narrabri); terete, red, covered with glands (Wallangarra).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. obliqua*, medium, lanceolate, glabrous, rachis minutely glandular.

*E. Andrewsii*, rather long, oblong to lanceolate, glabrous, and rachis glabrous.

*E. Penrithensis*, short, lanceolate, glabrous, rachis slightly glandular.

(5) *Subsequent Pairs of Leaves* (Number, petiole).

*E. obliqua*, three or four, medium to sessile or nearly so.

*E. Andrewsii*, three or four, petioles medium throughout.

*E. Penrithensis*, four, short throughout.

## (5a) (Shape, vestiture).

*E. obliqua*, lanceolate to broad lanceolate, undulate, margins slightly toothed or hispid.

*E. Andrewsii*, oblong to lanceolate, glabrous.

*E. Penrithensis*, oblong to lanceolate, glabrous, or with very fine stellate hairs.

(6) *Intermediate Leaves.*

*E. obliqua*, leaves broadly and distinctly obliquely lanceolate, slightly undulate, veins more or less prominent, few and rather distant; the intramarginal vein undulate, and distant from the edge; petiole medium. At 28½ inches, 11 cm. long, 5 cm. broad; dark green, mottled yellowish-green; petiole partly purple-brown and partly light yellowish-green. Stem the same colour as the petiole (Wingello, A. Murphy).

*E. Andrews*—leaves narrow to broad-lanceolate, slightly oblique when the latter; the narrow ones more inclined to oblong-lanceolate; firm to slightly undulate; veins scarcely prominent, more numerous than in *E. obliqua*; the intramarginal vein undulate and closer to the edge than in the above species; 5–11 cm. long, 2–5 cm. broad; pale glaucous to light green; petiole short, a rich purple-brown, which extends into the midrib for its entire length. Stem a rich purple-brown.

*E. Penrithensis*, leaves lanceolate to slightly oblique-lanceolate, slightly undulate, the veins scarcely distinct, the intramarginal vein close to the edge; petiole short, or much shorter than in *E. obliqua* and *E. Andrews*. At 17 inches high, 10.5 cm. long, 3 cm. broad; dark green, shaded with yellowish-green. Stem a very dull purple-brown.

(6a) (Miss Flockton).

*E. obliqua.*

*1st leaves* ovate, shortly petiolate, later broadly lanceolate, cordate at the base, nearly sessile, undersurface pale green; glands on midrib and edges (Wingello).

*1st leaves* ovate or narrow-ovate, pedunculate, undersurface purple shade (Wingello, No. 2).

*1st leaves* ovate to lanceolate, shortly petiolate (Kuitpo).

*E. Andrews*.

*1st leaves* ovate, petiolate, undersurface bright purple. *Leaves* ovate, shortly petiolate, undersurface pale green, blotched with purple (Howell).

*1st leaves* ovate, edges and part of midrib red, short peduncle. *Leaves* alternate, glaucous, edges and petioles red (Narrabri).

*1st leaves* ovate-lanceolate, midrib and edges tinted red (Narrabri, No. 2).

*1st leaves* ovate, petiolate, undersurface mauve. *Leaves* ovate, shortly petiolate, dull green with red edges and midrib, decussate (Wallangarra).

*E. Penrithensis.*

*1st leaves* ovate, lanceolate, shortly petiolate, edges with stellate glands at intervals (Galston Road).

### 3e.—*Acmenioides* Series.

*E. acmenioides*.

*E. umbra*.

*General Appearance*.—Leaves at first lanceolate, obtuse, petiolate, then changing to broad lanceolate, sessile or slightly stem-clasping, more or less undulate, often with an attenuate point, opposite character indefinite. The colour varies from pale green to lighter green, shaded glaucous and pale purple-brown. Midrib often reddish. Stems reddish.

(1) *Hypocotyl*.

*E. acmenioides* }  
*E. umbra* } Medium to long.

(1a) *Hypocotyl* (Miss Flockton).

*E. acmenioides*, terete and sturdy (Gosford); terete, smooth, wiry, red (Upper Clarence).

*E. umbra*, terete, inclined to be grooved on one side, red (Kincumber); inclined to be angular, texture rough, red (Wyang); terete, slightly ribbed, red (Gosford); terete, shaded pink (Fraser Island); terete, red (Manly).

(2) *Cotyledons* (Petiole, taper).

*E. acmenioides* }  
*E. umbra* } Medium, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. acmenioides*, red (Gosford); green, slightly tinted mauve (Gosford, 79); shaded puce (Upper Clarence).

*E. umbra* puce (Kincumber); mauve (Wyang); red (Gosford); pale puce (Fraser Island); purple-red (Manly).

(3) *Stem* (Miss Flockton).

*E. acmenioides*, deep purple-red (Gosford); terete, smooth, red (Gosford); pink tinted (Wyang).

*E. umbra*, terete, shaded red, with prominent glands (Kincumber); slightly flattened, purple-brown, covered with warty glands (Wyang); purple-red, smooth at 10 inches high (Gosford); terete, red, some glands (Fraser Island); terete, red, thickly covered with warty glands (Manly).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. acmenioides* short, lanceolate, glabrous.

*E. umbra*, petiolate, lanceolate, glabrous, rachis glandular.

(5) *Subsequent Pairs of Leaves* (Number, petiole).

*E. acmenioides*, numerous, sessile to shortly petiolate.

*E. umbra*, numerous, sessile to shortly petiolate.

(5a) *Subsequent Pairs of Leaves* (Shape, vestiture).

*E. acmenioides*, lanceolate to broad-lanceolate, stem-clasping, boat-shaped, glabrous.

*E. umbra*, lanceolate to broad-lanceolate, stem-clasping, boat-shaped, glabrous.

The opposite character is very marked in both species.

(6) *Intermediate Leaves*.

*E. acmenioides*, leaves lanceolate, slightly undulate, veins not conspicuous, sessile or very shortly petiolate, 11 cm. long, 4 cm. broad, dark green. Stem pale green.

*E. umbra*, leaves broad lanceolate, distinctly undulate, veins fairly prominent, sessile to shortly petiolate, 10–12 cm. long, 2–4.5 cm. broad, light green, midrib pale purple-brown; stem dull purple-brown; young tips dull purple-brown tinged with pale green. *E. umbra* appears to be constantly more highly coloured than *E. acmenioides*.

## (6a) (Miss Flockton).

*E. acmenioides*.

*1st leaves* ovate, petiolate, undersurface purple (Gosford).

*1st leaves* ovate, shortly petiolate, dark green. *Leaves* later lanceolate, stem-clasping, undersurface paler; stiff (Gosford, 79).

*1st leaves* lanceolate, petiolate, afterwards becoming large ovate lanceolate, undulate and almost stem-clasping; opposite. Height 9 inches, still opposite (Wyang).

*E. umbra*.

*1st leaves* ovate, petiolate, later ovate, sessile to stem-clasping, undersurface paler green (Kincumber).

*1st leaves* ovate, undersurface purple shade, later, large ovate acute, stem-clasping, glands on midrib. Unchanged at 10 inches high, but branching (Wyang).

*1st leaves* ovate, shortly petiolate. *Leaves* large, ovate, stem-clasping, undersurface paler green. Height 10 inches, but not branching. Still opposite. See note to A. 59 (Gosford, 85).

*1st leaves* ovate, shortly petiolate, undersurface pale green. Leaves at 5 inches high unchanged, except rather broader (Fraser Island).

*1st leaves* ovate, petiolate. *Leaves* lanceolate, sessile, decussate, undersurface paler green, red midrib and some edges. At 5 inches still opposite, sessile, but not stem-clasping (Manly).

### 3f.—*Amygdalina* Series.

*E. linearis.*

*E. numerosa.*

*E. amygdalina.*

*E. radiata.*

*General Appearance.*—Leaves linear-oblong to attenuate-lanceolate, sessile or partly stem-clasping, usually decussate and parallel, the opposite character persistent for a long period; pale green, shaded glaucous. (The leaves of *E. radiata* are specially aromatic.) Stems pale purple-brown or pale green.

#### (1) *Hypocotyl.*

*E. linearis*, medium to long.

*E. amygdalina*, medium.

*E. numerosa*, medium.

*E. radiata*, short to very short.

#### (1a) *Hypocotyl* (Miss Flockton).

*E. linearis*, terete, red (Chimney Pot); tapers abruptly into the root, crimson (Hobart).

*E. amygdalina*, terete, smooth, red, weak (Hobart); terete, red (Kelvedon).

*E. numerosa*, terete, slightly ribbed, red (Berrima); smooth, red (Cobbitty); red, slightly ribbed (Bent's Basin).

*E. radiata*, terete, red (Nundle); terete, slightly ribbed, red (Nerrigundah); terete, slightly ribbed beneath the cotyledons, tinted red (Wyndham); terete, slightly ribbed, red or purple (Buddawang); terete, slightly ribbed, red (Wyndham, No. 2); red, very short or ribbed (Mount Wilson).

#### (2) *Cotyledons* (Petiole, taper).

*E. linearis*  
*E. amygdalina* } medium, tapering.  
*E. numerosa* }

*E. radiata*, short to medium, tapering.

#### (2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. linearis*, deep puce (Chimney Pot).

*E. amygdalina*, crimson (Hobart); pink (Kelvedon).

*E. numerosa*, purple (Berrima, Cobbitty and Bent's Basin).

*E. radiata*, green, with a slight mauve tint (Nundle); purple (Nerrigundah); green, with a faint purple tint (Wyndham); pale, with slight purple tint (Buddawang); slight purple tint (Mount Wilson).

(3) *Stem* (Miss Flockton).

*E. linearis*, terete, red, covered with warty glands (Chimney Pot); crimson, with warty protuberances (Hobart).

*E. amygdalina*, terete, dark purple-red, with rough glands (Hobart); terete, red, prominent glands (Kelvedon).

*E. numerosa*, terete, shaded red, prominent glands (Berrima); shaded purple, covered with protuberant warty glands (Cobbitty); terete, shaded red, protuberant warty glands (Bent's Basin).

*E. radiata*, epicotyl and stem covered with prominent wart-like glands (Nundle); terete, purple, covered with protuberant glands (Nerrigundah); terete, purple, covered with protuberant glands (Buddawang); terete, shaded purple, covered with prominent glands (Wyndham); terete, red, covered with warty glands (Mount Wilson).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. linearis*, petiole very short, linear-lanceolate, glabrous, rachis minutely glandular.

*E. amygdalina*, petiole short, oblong-lanceolate, glabrous, rachis minutely glandular, more so than in *E. linearis*.

*E. numerosa*, sessile to very shortly petiolate, linear-lanceolate to lanceolate, glabrous, rachis minutely glandular.

*E. radiata*, sessile to very shortly petiolate, linear to linear-lanceolate, glabrous, rachis minutely glandular.

(5) *Subsequent Pairs of Leaves* (Number, petiole).

*E. linearis*, five or more, begins to be alternate at about 20 cm. high, all sessile.

*E. amygdalina*, numerous, up to 19½ inches at least, sessile and stem-clasping.

*E. numerosa*, numerous, up to 19 inches at least, sessile or minutely petiolate.

*E. radiata*, numerous, up to 14 inches at least (plant then removed), sessile.

(5a) *Subsequent Pairs of Leaves* (Shape, vestiture).

*E. linearis*, linear and very long, margin distantly toothed, glandular, rachis purple-brown and sometimes the leaves.

*E. amygdalina*, oblong to oblong-lanceolate and nearly linear, slightly stem-clasping, glandular, rachis purple-brown and sometimes the leaves.

*E. numerosa*, linear to oblong-lanceolate, slightly stem-clasping, glandular, rachis purple-brown to green, and sometimes the leaves.

*E. radiata*, lanceolate to nearly linear-lanceolate, slightly stem-clasping, margins slightly undulate, glandular, rachis purple-brown to green.

(6) *Intermediate Leaves.*

*E. linearis*, leaves linear, flexuose, passing into almost terete filiform, when broad, denticulate as in the seedling leaves, dark green, veins obscure, 5 to 7 cm. long to 4 mm. broad. Stem glandular hispid.

*E. amygdalina*, leaves narrow oblong-lanceolate, shortly petiolate, slightly tapering at the base, veins obscure, 5 to 8 cm. long, about 10 mm. broad, light green. Stem glandular hispid.

*E. numerosa*, not seen. These are opposite for such a long period that the intermediate characters are not brought out in pot seedlings.

*E. radiata*, not seen.

## (6a) (Miss Flockton).

*E. linearis.*

*1st leaves* linear, undersurface purple, sessile, edge sometimes irregular, a few glands on the midrib (undersurface). *Plant at 13 inches high*:—Leaves still linear, and the stems still covered with prominent red glands. The plant is much branched and bushy. The outline of the leaves is irregular (Chimney Pot Hill).

*1st leaves* ovate-lanceolate, undersurface purple. *1st alternate leaves* purple (Hobart).

*E. amygdalina.*

*1st leaves* narrow-lanceolate, sessile, decussate. *Leaves* dark bluish-green with red edges and midrib, and much purple colouring throughout (Hobart).

*1st leaves* ovate, sessile, undersurface tinted purple, later becoming ovate-lanceolate and stem-clasping (Kelvedon).

*E. numerosa.*

*1st leaves* linear, very shortly petiolate, undersurface pale opaque green with purple shade. Glands on the edges of the leaves (Berrima).

*1st leaves* linear, petiole short, afterwards larger, decussate, undersurface slightly paler green, with purple tint (Cobbitty).

*1st leaves* linear, almost sessile, but not stem-clasping. The undersurface glaucous and with a purple shade. Glands on the edges of the leaves.

*E. radiata.*

*1st leaves* ovate-lanceolate, sessile, undersurface pale opaque green, with mauve tint; decussate (Nundle).

*1st leaves* lanceolate, with prominent glands on undersurface of the midrib, and showing as yellow dots on the upper surface; undersurface purple. Sessile or stem-clasping. The midrib is purple on the upper side also, the edges slightly so (Nerri-gundah).

*1st leaves* lanceolate, stem-clasping, with prominent glands on the midribs and edges; undersurface purple. On the upper side the glands are prominent on the third pair of leaves; before this, they show as yellow dots (Buddawang).

*1st leaves* lanceolate, undersurface pale glaucous with a slight purple tint, stem-clasping. A few scattered glands on the edges and back of leaves (Wyndham).

*1st leaves* very tiny linear, stem-clasping, becoming ovate (Mount Wilson).

### 3g.—Glaucous-Sessile Series.

*E. Smithii*.

*E. coccifera* (small).

*E. dives* (large).

(This Series connects with *E. cordata*, *E. pulverulenta* in the Bilobæ Series—see next Part.)

*General Appearance*.—Cordate-lanceolate; opposite character well marked. Leaves at first short and broad, very shortly petiolate, ovate or oblong-ovate, then changing to cordate-lanceolate or elliptical-lanceolate, according to the species; sessile; glaucous throughout, the veins white or shaded pink. Stems very pale purple-brown, changing to glaucous.

#### (1) *Hypocotyl*.

*E. coccifera*, terete, woody, glabrous, dark purple near the base, 1·5-2 cm. long, ·5-1 mm. thick (Lubbock).

*E. Smithii*, *E. coccifera*, *E. dives*, all medium.

#### (1a) *Hypocotyl* (Miss Flockton).

*E. Smithii*, angular, deep crimson, shading up lighter (Wingello).

*E. coccifera*, terete, smooth, red (Mount Wellington); red (Tasmania).

*E. dives*, red (Wingello); terete, red (Cooma).

#### (2) *Cotyledons* (Petiole, taper).

Shortly stalked, ·5-·75 cm. long, ·5 cm. wide, obcordate, cuneate at base, retuse at apex, obscurely nerved, glabrous, not very thick, dark green above, dark purple beneath, rather persistent (Lubbock).

*E. Smithii*, petiole medium, tapering.

*E. coccifera*, short, tapering.

*E. dives*, short to medium, tapering.

#### (2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. coccifera*, rich crimson (Mount Wellington).

*E. dives*, red (Wingello); slight purple tint (Cooma).



(3) *Stem.*

*E. coccifera*, firm, terete, scabrous, dark purple; internodes varying from 1-3 cm. in length, 1 mm. thick (Lubbock).

(Miss Flockton.)

*E. Smithii*, a little angular, pale green, dotted with warty glands (Wingello); red, (Wingello); purple (Wingello).

*E. coccifera*, smooth, green (Tasmania).

*E. dives*, shaded red, terete, covered with prominent glands (? stellate) (Cooma).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Smithii*, shortly petiolate, linear-lanceolate, glabrous, rachis minutely glandular, glaucous.

*E. coccifera*, short, elliptical.

*E. dives*, very short, ovate to elliptical, glabrous, rachis glabrous.

(5) *Subsequent Pairs of Leaves* (Number, petiole).

*E. Smithii*, numerous, up to 32 inches at least, sessile and stem-clasping.

*E. coccifera*, five or more, short.

*E. dives*, numerous, very shortly petiolate to sessile and stem-clasping.

(5a) *Subsequent Pairs of Leaves* (Shape, vestiture).

*E. Smithii*, lanceolate to linear-lanceolate, decussate, stem-clasping, minutely glandular, glaucous.

*E. coccifera*, elliptical-decussate, rachis glandular.

*E. dives*, lanceolate to ovate, glaucous.

(6) *Intermediate Leaves.*

*E. Smithii*, *E. coccifera*, *E. dives*, not seen.

The species appear to be opposite for a long period.

"Leaves as in *E. globulus*, but ovate, deep green above, purplish beneath at least in the seedling stage. Nos. 1 and 2. Including the short scabrous petiole, 1-1.5 cm long, .5 cm. wide, ovate-lanceolate, entire, with sunk midrib and obscurely penninerved, glabrous, thin, dark green above, dark purple beneath in the early stages. Nos. 3 and 4. The same, but more oblong, rounded at both ends. Nos. 5 and 6. The same, but larger." (Lubbock, p. 532, under *E. coccifera*.)

## (6a) (Miss Flockton).

*E. Smithii.*

*1st leaves* linear, undersurface purple shade, running parallel with the cotyledons. Unchanged, still opposite at 10 inches (Wingello).

*1st leaves* linear, undersurface red. At 15 inches the leaves are still opposite, nearly stem-clasping, narrow ovate-lanceolate (Wingello).

*E. coccifera.*

1st leaves small, ovate, sessile (Mount Wellington); ovate (Cresswell, Tasmania).

*E. dives.*

1st leaves elliptical, purple stain at back (Wingello); ovate, undersurface pale green (Cooma).

### 3h.—Sieberiana Series (semi-glaucous).

*E. tæniola.*

*E. Simmondsii.*

*E. Consideniana.*

*E. Sieberiana.*

*E. pilularis.*

*E. piperita.*

*General Appearance.*—In the early stages the leaves are spreading, or almost parallel, oblong to oblong-lanceolate (except *E. Simmondsii*, which is elliptical-lanceolate), sessile, glaucous green or dark green shading to olive green, tinged with purple-brown; veins somewhat distinct, spreading, 7–10 cm. long, 1–2.5 cm. broad; young tips a light purple-brown. Stems green or purple-brown. The opposite character of the leaves of this series is very marked, and it therefore shows some affinity to the Amygdalina Series (3F), and also to *E. maculosa* in the Bilobæ.

(1) *Hypocotyl.*

*E. tæniola*

*E. Consideniana*

*E. pilularis*

} medium to long.

*E. Simmondsii*, short, smooth.

*E. Sieberiana*, medium to long.

*E. piperita.*

(1a) *Hypocotyl* (Miss Flockton).

*E. Consideniana*, red (Barrengarry; terete, with cracks or fissures, red-brown (Wingello); terete, slightly ribbed, red (Boggy Creek).

*E. pilularis*, tinted red, slightly angular, thickening to the root (Woy Woy); tinted pink, slightly angular, thickening to the root (Oatley); terete, red, a little ribbed (Pambula).

*E. Simmondsii*, red, becoming lighter towards the cotyledons. Four red lines running down the hypocotyl, making it appear angular (Smithton).

*E. Sieberiana*, terete, red (Wingello and Manly).

*E. piperita*, terete, sometimes ribbed, red, spindly (Leura); slightly angular, sturdy, red (Blackheath); smooth, red, thickening slightly to the root (Wingello); terete, shaded pink (National Park); red (Wingello).

(2) *Cotyledons* (Petiole, taper).

- E. tæniola*, short, tapering.  
*E. Consideniana*, medium, slightly tapering.  
*E. pilularis*, medium, tapering, trinerved.  
*E. Simmondsii*, fairly long, tapering.  
*E. Sieberiana*, petiolate, tapering.  
*E. piperita*, medium, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

- E. tæniola*, red.  
*E. Consideniana*, crimson (Barrengarry); deep crimson (Wingello); crimson purple (Boggy Creek).  
*E. pilularis*, deep crimson-purple, trinerved (Woy Woy); crimson (Oatley); slight purple tint or sometimes deep crimson (Pambula).  
*E. Simmondsii*, purplish (Smithton).  
*E. Sieberiana*, red (Wingello); purple (Wingello and Manly).  
*E. piperita*, variable purple tint (Leura); deep red (Blackheath); purple (Wingello and National Park); red (Wingello).

(3) *Stem* (Miss Flockton).

- E. tæniola*, terete, red.  
*E. Consideniana*, smooth, faint pink tint (Barrengarry Mountain); the epicotyl with raised glandular processes, sturdy (Wingello); terete, covered with small stellate glands (Boggy Creek).  
*E. pilularis*, above the hypocotyl covered with prominent warty glands, purple red in colour (Woy Woy); terete, shaded pink, stellate glands (Pambula).  
*E. Simmondsii*, terete, dark red, glandular (Smithton).  
*E. Sieberiana*, crimson (Wingello, No. 1); pinkish brown, in some thickly covered with protuberant glands, in some hardly any at all (Wingello, No. 2); terete, red, with glands (Manly).  
*E. piperita*, epicotyl terete, red, small stellate glands (Blackheath); above the hypocotyl covered with prominent glands (Wingello, No. 1); thick, terete, tinted pink, oil glands (Wingello, No. 2).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

- E. tæniola*, petiole short; oblong-lanceolate, obtuse; glabrous.  
*E. Consideniana*, short; lanceolate, acute; glabrous.  
*E. pilularis*, short, lanceolate; glabrous, rachis glandular.  
*E. Simmondsii*, very short; oblong-lanceolate, rachis slightly glandular.  
*E. Sieberiana*, medium, oblong-lanceolate, obtuse, glabrous.  
*E. piperita*, short, lanceolate; glabrous, rachis minutely glandular.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. tæniola*, five or more, shortly petiolate to sessile, oblong to lanceolate, slightly boat-shaped, glabrous, upper rachis glandular.

*E. Consideniana*, three or more, petiole short to sessile, oblong-lanceolate to lanceolate, slightly boat-shaped, glabrous.

*E. pilularis*, five or more, sessile to stem-clasping, lanceolate to narrow-lanceolate, tapering boat-shaped, glabrous, stem more or less glandular hispid.

*E. Simmondsii*, six or more, sessile to stem-clasping, oblong to broad-lanceolate, slightly glandular, the two upper pairs (at 7 inches) denticulate, whitish underneath.

*E. Sieberiana*, four or more, sessile; oblong to lanceolate, slightly boat-shaped; glabrous.

*E. piperita*, five or more, shortly petiolate to stem-clasping, oblong to broad-lanceolate, sometimes boat-shaped, glabrous.

(6) *Intermediate Leaves*.

*E. tæniola*, leaves oblong to narrow-lanceolate, shortly petiolate, veins obscure. At 36 inches, 7 to 10 cm. long, 1 cm. broad; yellowish green. Stem reddish.

*E. Consideniana*, leaves oblong to obliquely lanceolate falcate, slightly undulate; petiole shortish; venation moderately distinct. At 15½ inches, 14 cm. long, 3 cm. broad. Light green; stem pale pink to pale red. At one state *E. Consideniana* shows a strong affinity to *E. vitrea*.

*E. pilularis*, leaves obliquely lanceolate, shortly petiolate, thin, slightly undulate, 9 to 12 cm. long, 2.5 to 4 cm. broad.

*E. Simmondsii*, not seen. It is still opposite at 13 inches. The leaves are sessile to stem-clasping, lanceolate, acute, more or less rigid.

*E. Sieberiana*, leaves broad lanceolate, ovate-lanceolate, changing to broad-lanceolate, usually oblique, slightly undulate; petiole at first short, but with the next three or four leaves extending to 15 mm., 5 cm. long, 3.5 cm. broad, slightly glaucous, the petiole and midrib orange red. Stem light yellowish green, deepening towards the top into orange red.

*E. piperita*, leaves oblong to oblong-lanceolate, shortly apiculate, the margins more or less undulate, the lamina sometimes turned upwards from the midrib; veins obscure, light yellowish green, the marginal nerve reddish; 7 cm. long, 2.5 cm. broad. Stem green, tinged red.

## (6a) (Miss Flockton).

*E. Consideniana*.

*1st leaves* ovate or lanceolate, venation red, petiolate, leaves becoming nearly sessile and 3 inches long (Barrengarry).

*1st leaves* ovate-lanceolate, undersurface pale opaque green, with mauve colouring. *Leaves* the first pair shortly petiolate, afterwards sessile or almost so; ovate lanceolate, decussate, dark green with red edges and midrib; undersurface pale glaucous green with mauve colouring (Wingello).

*1st leaves* ovate, pedunculate, undersurface purple (Boggy Creek).

*E. pilularis.*

*1st leaves* lanceolate, decussate, undersurface powdery white with a purple tint (Woy Woy). At 8 inches, still opposite and leaves 4 inches long.

*1st leaves* lanceolate, petioles short, opposite, afterwards becoming sessile, stem-clasping, opposite (Oatley).

*1st leaves* ovate, petiole short, undersurface slight purple tint. At  $7\frac{1}{2}$  inches the seedlings are identical with those from Oatley (Pambula).

*E. Simmondsii.*

*1st leaves* lanceolate, sessile, first pair slightly petiolate, decussate, undersurface purplish (Smithton).

*E. Sieberiana.*

*1st leaves* ovate, red at the base, edge and venation. *1st alternate leaves* ovate-lanceolate, undersurface purple (Wingello).

*1st leaves* ovate petiolate; undersurface rich purple, afterwards become decussate, sessile. *1st alternate leaves* ovate, ovate-lanceolate, the young leaves rose-coloured and pedunculate (Wingello).

*1st leaves* ovate, petiolate, undersurface pale whitish with purple tint, decussate. *Leaves*, third pair ovate-lanceolate or oblong with very short petiole. Plant at  $6\frac{1}{2}$  inches high has leaves still opposite and  $3\frac{1}{2}$  inches long, undersurface slightly paler (Manly).

*E. piperita.*

*1st leaves* ovate, undersurface shaded rich purple tint, petiolate, decussate. *Leaves after 1st pair* become stem-clasping; venation delicate and purple, also edges and midrib. Undersurface rich mauve. Seen later, with two more leaves, the same but red. At 11 inches high the leaves are broad and boat-shaped (Leura).

*1st leaves* ovate, sometimes slightly spathulate, the first pair very shortly petiolate, the next stem-clasping. Undersurface deep purple (Blackheath).

*1st leaves* ovate, shortly petiolate, undersurface purple shade, from the third pair ovate or oblong, decussate. A few glands on the midribs and edges of the leaves. *1st alternate leaves* ovate-acuminate, edges red, undersurface pale whitish-green (Wingello).

*1st leaves* ovate, undersurface purple shade, petiolate, becoming elliptical, undulate, sessile, red midrib. The leaves are opposite at 10 inches high, and full of yellow oil glands (Wingello).

*1st leaves* ovate-lanceolate to spathulate, undersurface purple tint (Wingello)

### 3i.—Glaucous, broad, rigid Series.

*E. virgata.*

*E. gigantea.*

*E. oreades.*

*General Appearance.*—Leaves at first subglaucous, but soon turning very glaucous, oblong-lanceolate to lanceolate, more or less venulose. Stems reddish. Intermediate stage oblong-lanceolate to lanceolate, apiculate, thick, glaucous, midrib reddish; lateral veins distinct. Stem yellowish to glaucous, shading to very pale purple-brown.

(1) *Hypocotyl.*

*E. virgata*, *E. oreades*, *E. gigantea*, all medium to long.

(1a) *Hypocotyl* (Miss Flockton).

*E. virgata*, terete, smooth, deep red (Berowra); terete, wiry, red (The Spit); terete, becoming ribbed under the cotyledons (National Park).

*E. oreades*, terete, red (Mount Victoria, 1 and 2).

*E. gigantea*, terete, tinted red (Tumberumba).

(2) *Cotyledons* (Petiole, taper).

<i>E. virgata</i>	}	petiolate, tapering, slightly trinerved.
<i>E. oreades</i>		
<i>E. gigantea</i>		

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. virgata*, deep crimson, also edge (Berowra); red (National Park).

*E. oreades*, red (Mount Victoria); deep crimson (Mount Victoria, No. 2); crimson purple (Mount Victoria, No. 3).

*E. gigantea*, purple red (Tumberumba).

(3) *Stem* (Miss Flockton).

*E. virgata*, deep red, flattened, and with warty glands (Berowra); terete, shaded puce, with small stellate glands (The Spit); terete, smooth, pale yellow green (National Park).

*E. oreades*, terete, deep reddish purple, shiny (Mount Victoria); crimson (Mount Victoria, No. 2); small stellate glands (Mount Victoria, No. 3).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. virgata*, petiole medium, leaves obtuse lanceolate, glabrous.

*E. oreades*, fairly short, lanceolate, glabrous.

*E. gigantea*, medium, lanceolate to oblong, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, petiole).

*E. virgata*, three, oblong to lanceolate, petiolate, glabrous.

*E. oreades*, two or more, oblong to oblong lanceolate, petiolate, glabrous.

*E. gigantea*, three, oblong to oblong lanceolate, petiolate, glabrous.

(6) *Intermediate Leaves*.

*E. virgata*, leaves oblong to oblong lanceolate, often shortly mucronate, thick, petioles short, 7 to 10 cm. long, 3 to 4 cm. broad, more or less glaucous, midrib whitish; stem pale to light purple-brown.

*E. oreades*, leaves oblong to oblong lanceolate, shortly petiolate, thick, veins prominent underneath, the central nerve considerably raised above the surface of the lamina, 10 to 14 cm. long, 4.5 to 7 cm. broad, glaucous shaded yellowish green, midrib reddish. Stem pale lilac rose, or pale purple-brown shaded glaucous.

*E. gigantea*, leaves oblong, mucronate to obliquely lanceolate, thick and firm, thicker than in the two preceding species; veins distinct, rather distant and spreading; petioles short to long, 7 to 10 cm. long, 2.5 to 3.5 cm. broad, glaucous shaded yellowish green; petiole slightly red-brown; stem yellowish.

## (6a) (Miss Flockton).

*E. virgata*.

*1st leaves* ovate, undersurface with some purple; later, the leaves oblong or obovate with undersurface rich purple and deep purple on the upperside nearest to the petiole; the venation also is purple. *1st alternate leaves* lanceolate, a little paler on the undersurface, red midrib and edges (Berowra).

*1st leaves* ovate, petiolate, undersurface puce (The Spit).

*1st leaves* ovate or spatulate, the venation and undersurface reddish puce, petiolate, decussate. *1st alternate leaves* ovate, stiff, petiolate, pale green on both sides (National Park).

*E. oreades*.

*1st leaves* small, ovate, petiolate, 1st pair; shortly petiolate (almost sessile), 2nd pair; then stem-clasping. *Alternate leaves* ovate-acute, stiff, petiolate, and of a beautiful glaucous green (Mount Victoria, No. 1).

*1st leaves* ovate, undersurface shaded crimson (Mount Victoria, No. 2).

*1st leaves* ovate, pedicel short, undersurface purple (Mount Victoria, No. 3).

*E. gigantea*.

*1st leaves* ovate, undersurface rich purple red, pedunculate, decussate (Tumberumba).

### 3j.—Sub-Glaucous Series.

*E. micrantha*.

*E. hæmastoma*.

*General Appearance*.—Leaves pale glaucous green, shading to yellowish green, somewhat rigid, but not as rigid as *E. virgata*, &c.; oblong-lanceolate to lanceolate, soon alternate, rarely beyond 7 cm. long in the opposite stage; veins somewhat, prominent, the midrib reddish or pale green. Stems light purple-brown.

(1) *Hypocotyl*.

*E. micrantha*, *E. hæmastoma*, medium.

(1a) *Hypocotyl* (Miss Flockton).

*E. micrantha*, smooth, deep red (Grattai); terete, red (Pilliga Scrub); smooth red (Narrabri).

*E. hæmastoma*, terete, red (Hornsby); smooth, red (Berowra); terete, red, smooth (Gosford).

(2) *Cotyledons*. (Petiole, taper).

*E. micrantha*, shortly petiolate; tapering.

*E. hæmastoma*, short to long; tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. micrantha*, deep purple red (Grattai); deep red (Grattai No. 2); deep crimson (Pilliga); crimson (Narrabri).

*E. hæmastoma*, rich puce (Hornsby); purple red (Berowra).

(3) *Stem* (Miss Flockton).

*E. micrantha*, terete, red, smooth (Grattai); red with scattered warty glands (Grattai No. 2); a little flattened, red, hardly any visible glands (Narrabri); thickly covered with warty glands, small and close together (Narrabri, No. 2).

*E. hæmastoma*, rough with small glands, the stem later being covered with fine, close, shiny stellate glands (Berowra).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. micrantha*, petioles rather short, lanceolate to narrow lanceolate, glabrous.

*E. hæmastoma*, petioles rather short, oblong to oblong lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, petiole).

*E. micrantha*, two, short.

*E. hæmastoma*, two or more, short.

(5a) *Subsequent Pairs of Leaves* (Shape, vestiture).

*E. micrantha*, oblong to lanceolate, glabrous.

*E. hæmastoma*, oblong to lanceolate, glabrous.



(6) *Intermediate Leaves.*

*E. micrantha*, leaves somewhat rigid, thickish, obtuse, lanceolate to lanceolate falcate, shortly petiolate, veins moderately distinct, 6 cm. long, 2.5 cm. broad, somewhat glaucous. Stem smooth, pale purple-brown.

*E. hæmastoma*, leaves oblong to broad-lanceolate, all more or less shortly petiolate, thick veins somewhat obscure, 7 to 10 cm. long, 2 to 4 cm. broad (but they may be much broader), slightly glaucous at first, but afterwards changing to a deep olive green, the midrib either yellowish or a dull purple-brown. Stem a dull purple brown.

## (6a) (Miss Flockton).

*E. micrantha.*

*1st leaves* ovate, petioles short, undersurface paler green; later ovate-lanceolate and lanceolate, petioles short (Grattai).

*1st leaves* ovate or narrower, undersurface pale glaucous green, with a purple shade, edged with red. *1st alternate leaves* lanceolate, red edge, although in the alternate stage, each pair of leaves is strictly at right angles to the former pair (Grattai, No. 2).

*1st leaves* small, ovate (Pilliga).

*1st leaves* ovate, undersurface paler green. *1st alternate leaves* lanceolate, with a bluish white bloom (Narrabri).

*E. hæmastoma.*

*1st leaves* ovate, undersurface deep puce (Hornsby).

*1st leaves* lanceolate, undersurface purple tint. *1st alternate leaves* large, lanceolate (or ovate-lanceolate), thick, stiff, undersurface slightly paler, edges yellow-brown. Intramarginal vein very near edge of leaf (Berowra).

**3k.—Intermediate rigid Series.**

(Intermediate between Nos. 9 and 12.)

*E. stricta.**E. obtusiflora.**E. fraxinoides.*

*General Appearance.*—Leaves at first oblong-lanceolate, shortly petiolate, venation almost parallel, firm, then changing to lanceolate, rigid, yellowish green, slightly tinged glaucous. Stems usually a deep purple-brown.

(1) *Hypocotyl.*

*E. stricta*, long.

*E. obtusiflora*, medium to long.

*E. fraxinoides*, medium to long.

(1a) *Hypocotyl* (Miss Flockton).*E. stricta*, terete, red.*E. obtusiflora*, terete, red, tall; terete, wiry, red; terete, tinted red.*E. fraxinoides*, terete, smooth, ribbed, dark red (Monga); terete, red (State Forest 577; also Nerriga).(2) *Cotyledons* (Petiole, taper).*E. stricta*, medium, tapering, slightly trinerved.*E. obtusiflora*, medium, tapering, trinerved.*E. fraxinoides*, medium, tapering.(2a) *Undersurface* (Miss Flockton).*E. stricta*, crimson; deep purple-red.*E. obtusiflora*, mauve; puce; purple-red.*E. fraxinoides*, deep purple red; tinted red; crimson.(3) *Stem* (Miss Flockton).*E. stricta*, terete, crimson with stellate protuberances (King's Tableland); terete, red, with prominent glands (Blackheath).*E. obtusiflora*, terete, shaded puce, covered with stellate glands (The Spit).*E. fraxinoides*, red, a little flattened, with small warty glands (Rocks, Nerriga).(4) *1st Pair of Leaves* (Petiole, shape, vestiture).*E. stricta*, short, oblong to lanceolate, glabrous.*E. obtusiflora*, short, oblong, glabrous, rachis glandular.*E. fraxinoides*, short, lanceolate, glabrous, rachis minutely glandular.(5) *Subsequent Pairs of Leaves* (Number, petiole).*E. stricta*, two, short.*E. obtusiflora*, two, short.*E. fraxinoides*, three or more, short.(5a) *Subsequent Pairs of Leaves* (Shape, vestiture).*E. stricta*, oblong-lanceolate, glabrous.*E. obtusiflora*, lanceolate, minutely denticulate, the stem glandular.*E. fraxinoides*, lanceolate, slightly denticulate the stem glandular.

(6) *Intermediate Leaves.*

*E. stricta.* Leaves lanceolate, rigid, obscurely veined, light yellowish green, 7-9 cm. long, 12-15 mm. broad, petiole short. Stem a dull purple-brown, shaded yellowish green. (Wentworth Falls, A. A. Hamilton.)

*E. obtusiflora.* Leaves lanceolate, thick and rigid, light green with a tinge of glaucousness, and also shaded a pale yellowish green, 7-10 cm. long, 1-2 cm. broad; shortly petiolate. Stem a dull purple-brown. (The Spit, W. F. Blakely and J. L. Boorman.)

*E. fraxinoides.* Leaves oblong-lanceolate to lanceolate, scarcely rigid, veins somewhat prominent, dark green shading to yellowish green with a glaucous tinge, 9 cm. long, 2.5 cm. broad; petiole medium. Stem glandular verrucose, a rich purple brown. (State Forest 577, R. C. Blacket.)

(6a) (Miss Flockton).

*E. stricta.*

*1st leaves* ovate, ovate lanceolate, colour rich dark green, undersurface deep red (Blackheath, No. 1).

*1st leaves* ovate, very shortly petiolate; undersurface purple shade. Later, ovate sessile, lanceolate; undersurface with some purple (Blackheath No. 2).

*1st leaves* ovate, sessile or nearly so; stellate glands on the edges and midrib; undersurface crimson-purple (King's Tableland).

*E. obtusiflora.*

*1st leaves* ovate, shortly petiolate, sometimes sessile. About the third pair, small stellate glands on the edges of these; undersurface puce (The Spit).

*1st leaves* sessile or nearly so, decussate, undersurface purple red (Manly).

*E. fraxinoides.*

*1st leaves* ovate, sessile, with stellate hairs on midrib and edges; undersurface deep purple-red (Sugarloaf).

*1st leaves* stem-clasping, oblong, but narrower at the base. *1st alternate leaves* ovate-lanceolate, edges red, glaucous, the undersurface slightly paler (Rocks, Nerriga).

*1st leaves* ovate, lanceolate stem-clasping, narrowing at the base, undersurface pale green. *1st alternate leaves* ovate-lanceolate, pedunculate, undersurface pale green (Nerriga).

**3m.—Narrow, rigid Series.**

*E. nitida.*

*E. approximans.*

*E. Mitchelliana.*

*E. Kybeanensis.*

*E. apiculata.*

*General Appearance.*—Leaves at first small, oblong-lanceolate to lanceolate, very shortly petiolate, venation more or less parallel, firm, then changing to narrow-lanceolate rigid, shortly petiolate, varying from slightly glaucous to olive-green. Stems purple-brown, sometimes shading into very pale yellowish-green.

(1) *Hypocotyl*.*E. nitida*, medium.*E. Mitchelliana*, short, smooth.

<i>E. apiculata</i>	}	medium.
<i>E. approximans</i>		
<i>E. Kybeanensis</i>		

(1a) *Hypocotyl* (Miss Flockton).*E. nitida*, short, red (Tasmania).*E. Mitchelliana*, erect, terete, red, glabrous, up to 2·3 cm. long (original description); short, terete, pink (Mount Buffalo).*E. apiculata*, inclined to be angular, red (Berrima).*E. approximans*, terete, smooth, red-brown. Tapering into the root, slightly angular, purple (Barren Mountain).*E. Kybeanensis*, terete, red (Kybean).(2) *Cotyledons* (Petiole, taper).*E. nitida*, short, tapering.*E. Mitchelliana*, short, tapering.*E. apiculata*, medium, slightly tapering.*E. approximans*, medium, tapering.*E. Kybeanensis*, short, tapering.(2a) *Cotyledons* (Undersurface, Miss Flockton).*E. nitida*, sometimes tinted red (Tasmania).*E. Mitchelliana*, pink or tinted red (two sowings).*E. apiculata*, deep purple red.*E. approximans*, red, purple (two sowings).*E. Kybeanensis*, purple.(3) *Stem* (Miss Flockton).*E. nitida*, terete, becoming angular, covered with large, transparent, warty glands (Mount Bischoff).*E. apiculata*, crimson, thickly covered with small, stellate, glandular warts or processes (Berrima).*E. approximans*, a little flattened tinted red, and covered with warty glands, papillose or slightly stellate (first sowing). Shade of purple, tubular, covered with glandular warts (second sowing).*E. Kybeanensis*, terete, shaded red, covered with prominent glands and scaly (Kybean).

## (4) 1st Pair of Leaves (Petiole, shape, vestiture).

*E. nitida*, very short, linear-oblong, smallest of the four.

*E. Mitchelliana*, very short, narrow-lanceolate, slightly glandular.

*E. apiculata*, very short, linear-oblong, glabrous.

*E. approximans*, short, lanceolate, glabrous.

*E. Kybeanensis*, medium, lanceolate, but smaller than in *approximans*; glabrous.

## (5) Subsequent Pairs of Leaves (Number, petiole).

*E. nitida*, three, shortly petiolate.

*E. Mitchelliana*, four or more, very short.

*E. apiculata*, two, very short.

*E. approximans*, three, very short, upper rachis slightly glandular.

*E. Kybeanensis*, two or more, short.

## (5a) Subsequent Pairs of Leaves (Shape, vestiture).

*E. nitida*, lanceolate, glabrous.

*E. Mitchelliana*, narrow-lanceolate, rachis glandular.

*E. apiculata*, linear-oblong to narrow-lanceolate, glabrous.

*E. approximans*, lanceolate, glabrous.

*E. Kybeanensis*, lanceolate, slightly obtuse, glabrous.

## (6) Intermediate Leaves.

*E. nitida*, leaves narrow, lanceolate, somewhat rigid and very acute, shortly petiolate, 5 cm. long, 7 mm. broad, light green, shaded yellowish-green. Stem purple-brown (Mount Bischoff, Tasmania, R. H. Cambage).

*E. Mitchelliana*, leaves narrow-lanceolate, semi-rigid, ending in a long acuminate point; petiole short to medium, glaucous, shaded with light green, 5-8 cm. long, 8-13 mm. broad. Stem a dull purple-brown, shaded green (Mount Buffalo, R. H. Cambage).

*E. apiculata*, leaves narrow-lanceolate to acuminate-lanceolate, semi-rigid, the lamina slightly upturned from the midrib, light green with a slight glaucous tinge, which changes to a very pale yellowish-green; 9-10 cm. long, 10-14 mm. broad; petiole very short. Stem flexuose, a dull purple-brown (Berrima, J. L. Boorman).

*E. approximans*, leaves long and narrow, lanceolate, semi-rigid, pale green with a very faint tinge of glaucousness; 7 cm. long, 5-7 mm. broad; petiole very short. Stem a very full purple-brown (Barren Mountain, Dorriggo, J. L. Boorman).

*E. Kybeanensis*, leaves oblong-lanceolate to acuminate-lanceolate, rigid, dark green shaded yellowish-green, 5-9 cm. long, 7-10 mm. broad; petiole very short. Stem slightly flexuose, yellowish-brown. (Kybean, R. H. Cambage).

The venation of this group is very obscure; the median nerves appear to be much depressed above, and slightly prominent beneath.

(6a) (Miss Flockton).

*E. nitida.*

*1st leaves* narrow-ovate, or oblong, sessile. *1st alternate leaves* narrow-lanceolate, petioles short, venation indistinct, the same colour on both sides (Mount Bischoff).

*E. Mitchelliana.*

*1st leaves* ovate, petiolate. *Leaves* at  $7\frac{1}{2}$  inches, alternate, lanceolate, shortly petiolate (Mount Buffalo).

*E. apiculata.*

*1st leaves* lanceolate, undersurface red, a few glands on the edges. In some plants, the first two or three pairs of leaves are quite sessile (Berrima).

*E. approximans.*

*1st leaves* ovate, petioles short, undersurface tinted red, sometimes a few glands on the edges. *1st alternate leaves* narrow-lanceolate (Barren Mountain).

*1st leaves* ovate-lanceolate or lanceolate. *1st alternate leaves* linear-lanceolate (second sowing).

*E. Kybeanensis.*

*1st leaves* narrow-ovate, inclined to be spatulate, undersurface dull purple. *Leaves* later with short thick petiole and sharply pointed tip,  $\frac{1}{2}$  inch or less wide and  $4\frac{3}{4}$  inches long. Thick, the same texture and colour on both sides. The midrib channelled on the upper side (Kybean).

### 3n.—Narrow, longitudinal Series.

*E. Moorei.*

*E. vitrea.*

*General Appearance.*—Leaves at first oblong to elliptical-lanceolate, subglaucous to dark green, sessile. The next stage, oblong-lanceolate to lanceolate, sessile or very shortly petiolate in *E. Moorei*, soon alternate in the last species; opposite for an indefinite number of pairs in *E. Moorei*. Light to dark green. From the early to the approach of the intermediate stage, *E. vitrea* shows affinity to *E. radiata*, but the leaves of the former are larger, and even in the opposite stage the venation is more longitudinal than that of *E. radiata*. It becomes more marked as the plant develops.

In Nos. 3n and 3p (Longitudinal Series), the youngest leaves have not longitudinal venation, but rather a spreading one, sometimes even approaching the reticulate. It is only as growth proceeds, during the intermediate stage, and particularly as the mature stage is reached, that the longitudinal venation becomes unmistakable.

(1) *Hypocotyl.*

*E. Moorei*, medium to long, smooth.

*E. vitrea*, medium, smooth.

(1a) *Hypocotyl* (Miss Flockton).

*E. Moorei*, red (Currockbilly Mountain); terete, weak, red (Mount Victoria); terete, red (Mongarlowe).

*E. vitrea*, short, terete, punk, the epicotyl with stellate glandular processes (Penola); terete, red (Berrima and Wingello).

(2) *Cotyledons* (Petiole, taper).

*E. Moorei*, short, tapering.

*E. vitrea*, medium, tapering, trinerved.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Moorei*, tinted reddish purple (Currockbilly Mountain); slight purple tint (Mount Victoria); green (Mongarlowe).

*E. vitrea*, dull green (Penola); purplish-red, variable in tint (Berrima); purple tint (Wingello).

(3) *Stem* (Miss Flockton).

*E. Moorei*, round, covered with prominent warty glands (Currockbilly Mountain); terete, shaded red, prominent glands, stellate (Mongarlowe).

*E. vitrea*, epicotyl terete, red, thickly covered with glands, later becoming smooth (Wingello).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Moorei*, very short, narrow-lanceolate, slightly glandular.

*E. vitrea*, very short, linear-oblong, slightly glandular.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Moorei*, five or more, shortly petiolate, narrow-lanceolate to elliptical, changing to oblong-lanceolate, veins semi-longitudinal, glabrous. Stem minutely glandular (Mount Victoria, Boorman).

*E. vitrea*, twelve or more, sessile to very shortly petiolate, oblong-lanceolate to lanceolate-acuminate, the lamina upturned, undulate, changing to rigid lanceolate as the plant develops, veins prominent, semi-longitudinal, glabrous. Stem minutely glandular (Wingello, Boorman).

(6) *Intermediate Leaves*.

*E. Moorei*, leaves oblong-lanceolate to lanceolate, subrigid, acute, shortly petiolate, veins obscure, somewhat longitudinal, the intramarginal vein distant from the edge in the larger leaves, say, at 3 feet, when they get narrower. Olive-green, the tips slightly tinged with dull purple-brown. Stem glandular, a ruddy purple-brown (Mount Victoria, Boorman).

*E. vitrea*, intermediate leaves not seen. It is still opposite at 16½ inches.

The opposite character of the leaves is continued to a much greater period in *E. vitrea* than in *E. Moorei*. In the latter they appear to extend up to about 10 inches, and in the former to over 16 inches.

*E. vitrea* shows a marked affinity to *E. radiata* in the shape of its leaves, and to a limited extent in the venation. Stem more or less glandular, a very pale purple-brown, shaded pink. (Wingello, Boorman).

(6a) (Miss Flockton).

*E. Moorei*.

*1st leaves* ovate, undersurface pale opaque-green. *1st alternate leaves* lanceolate, venation scanty (Currockbilly Mountain).

*1st leaves* very small, lanceolate (Mount Victoria).

*1st leaves* narrow-ovate to ovate, undersurface paler green, petioles short (Mongarlowe).

*E. vitrea*.

*1st leaves* linear.

*1st leaves* lanceolate, obtuse, undersurface purple tinted. *Leaves* first two pairs shortly petiolate, afterwards sessile and stem-clasping. Later lanceolate and stem-clasping, undersurface paler green (Wingello).

### 3p.—Broad Longitudinal Series.

*E. coriacea*.

*E. de Beuzevillei*.

*E. niphophila*.

*E. stellulata*.

*General Appearance*.—Leaves all broad, ranging from oblong, elliptical to cordate, shortly petiolate to sessile, usually firm, somewhat thick, with more or less prominent veins; glaucous throughout, shaded yellowish-green in *E. coriacea* and *E. stellulata*. Stems terete, pale purple-brown to deep purple-brown. In the more advanced stages *E. de Beuzevillei* and *E. stellulata* are considerably broader than *E. coriacea*. The former show affinity to *E. alpina* in the broad, thick oblique leaves, and to *E. Simmondsii*, especially, in the opposite and shortly petiolate character of the leaves.

(1) *Hypocotyl*.

*E. coriacea*, medium to long, smooth.

*E. de Beuzevillei*, long, smooth.

*E. stellulata*, medium, smooth.

(1a) *Hypocotyl* (Miss Flockton).

*E. coriacea*, terete, red (Monga); terete, red (Grose Valley, Cooma); crimson, tapering into the root (Wingello).



*E. niphophila*, somewhat angular, red (Mount Currockbilly).

*E. de Beuzevillei*, terete, red (Jounama Peaks).

*E. stellulata*, terete, red, spindly (Wallerawang); terete, red, slight but straight (Wingello); very short, red (Hargraves).

(2) *Cotyledons* (Petiole and taper).

*E. coriacea*, medium, tapering.

*E. de Beuzevillei*, medium, tapering.

*E. stellulata*, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. coriacea*, sometimes tinted pink (Monga); purple (Wingello).

*E. niphophila*, green, or a slight tint of purple (Currockbilly).

*E. de Beuzevillei*, dark red (Jounama Peaks).

*E. stellulata*, pale green (Wallerawang); sometimes green, sometimes purple (Wingello); purple (Hargreaves).

(3) *Stem* (Miss Flockton).

*E. coriacea*, terete, pale green shaded pink, covered with prominent glands (Monga); terete, red, closely covered with small glandular warts (Wingello).

*E. niphophila*, terete, shaded pink, covered with small glands (Currockbilly).

*E. stellulata*, after the hypocotyl covered with glandular stellate processes (Hargraves); crimson (Marulan).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. coriacea*, very short, elliptical to oblong-lanceolate, glabrous.

*E. de Beuzevillei*, very short, narrow-lanceolate to broad-lanceolate, minutely glandular.

*E. stellulata*, short, ovate to ovate-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, petiole).

*E. coriacea*, three or more, very short.

*E. de Beuzevillei*, four or more, short.

*E. stellulata*, five or more. In one specimen they are still opposite at 21 inches; short.

(5a) *Subsequent Pairs of Leaves* (Shape, vestiture).

*E. coriacea*, oblong to oblong-lanceolate, glabrous.

*E. de Beuzevillei*, oblong-lanceolate to cordate; rachis slightly glandular.

*E. stellulata*, broadly elliptical, glabrous.

(6) *Intermediate Leaves*.

*E. coriacea*, leaves oblong to oblong-lanceolate, rigid, thick, more or less prominently veined, usually terminating in a strong mucro glaucous, shading to yellowish-green, 8 cm. long, 3 cm. broad, very shortly petiolate; stem terete, purple-brown (Braidwood).

*E. de Beuzevillei*, leaves obliquely ovate to lanceolate, thick, mucronate, prominently veined, glaucous, shaded very pale yellowish-green. Petioles medium, thick, yellowish-green tinged with purple-brown; at 17 inches 10.5 cm. long, 5 cm. broad. Stem terete, green (Jounama Peaks).

*E. stellulata*, leaves broadly ovate, shortly petiolate, mucronate, slightly glaucous, shaded yellowish-green; veins more or less prominent, curved longitudinally, or the two lower veins almost reaching to the apex; the intramarginal vein somewhat distant from the edge. At 34 inches, 7 cm. long, 4.5 cm. broad, midrib yellowish, the same colour passing into the semi-compressed petiole. At this stage the petiole is still very short. Stem slightly compressed, a dull purple-brown shaded yellowish-green (Hargraves).

## (6a) (Miss Flookton).

*E. coriacea*.

*1st leaves* ovate, shortly petiolate, undersurface pale whitish-green, sometimes tinted purple. *Leaves* ovate or ovate-lanceolate, petioles short, undersurface pale (Monga).

*1st leaves* ovate. *Leaves* still opposite, almost sessile, narrow ovate (Cooma).

*1st leaves* ovate, shortly petiolate, undersurface purple. *1st alternate leaves* ovate-lanceolate, undersurface a little paler. Red petiole, later becoming a blue glaucous colour (Wingello).

*E. niphophila*.

*1st leaves* ovate, short pedicel, undersurface slight purple tint. *Leaves* ovate or ovate-lanceolate, short petioles, undersurface pale, still opposite at 10 inches high. (Currockbilly).

*E. stellulata*.

*1st leaves* ovate, shortly petiolate, sometimes a little undulate. *Leaves*, fourth pair almost orbicular, sessile, edges and midrib red, decussate, undersurface pale (Wingello).

*1st leaves* ovate, undersurface green, stellate glands on the midribs and edges of the young growth. The first leaves are pedunculate, the third pair cordate and sessile (Hargraves).

*1st leaves* ovate-acute (Marulan).

## **DESIDERATA.**

The description of no species can be considered entirely satisfactory unless all parts of the plant have been ascertained. There is a good deal of work yet to be done in this direction. This should be systematically followed up, although, owing to the great distances in Australia, we may have to wait a long time for the material.

Inclusion in the list does not necessarily mean that I have no specimens of the organ asked for, but that I want better or more characteristic ones than shown in the drawings.

## **APPEARANCE OF TREE AND ECOLOGICAL PARTICULARS.**

Attention is invited to the above. Trees deemed to be characteristic should be chosen, and notes made when actually standing in front of the tree.

## **BARK.**

At Part L, p. 320, I have recommended combination of study of the bark with that of size and habit of the species, and also of the timber at the same time. See Part LI for the best account of the barks I know, but of some of the species mentioned our knowledge is defective, while of the barks of some we know little or nothing. See remarks under *Rhytiphloïæ* (p. 41), for example.

## **TIMBERS.**

My latest classification of timbers will be found at Part LIII. Of many we know little or nothing, partly because a botanist has usually no opportunity of cutting a piece of timber from a tree from which he has herbarium specimens, and, even if he had, the difficulty of transport often arises. It is also a matter of history that collections of timbers to match herbarium specimens are apt to disappear, and that is why I formed, *de novo*, the collection of timbers in the Technological Museum, and, later, the collection of smaller pieces in the Botanic Gardens Herbarium and Museum.

Of the timbers of *E. pruinosa* and *E. Shirleyi* I know nothing; the latter species has been disentangled from the former, and it is reasonable to suppose that a knowledge of the timbers would make the relations of the two species clearer. These examples are merely illustrative, as I want to emphasise the point that botanists should collect the timbers with bark on just as they do the twigs bearing flowers or fruits.

## JUVENILE LEAVES.

(What we want is the earliest stage of the juvenile leaf. The inclusion of the present large list does not mean that we have not juvenile leaves of most of the species, but it emphasises the point, stressed at Part LVI, p. 281, that the juvenile leaf is ideal, and many of our specimens do not attain to it.)

- |   |   |
|---|---|
| <i>E. Abergiana.</i> (Very little material of any kind extant.)   | <i>E. Griffithsii.</i>  |
| <i>E. adjuncta.</i>   | <i>E. grossa.</i>   |
| <i>E. angulosa.</i>   | <i>E. Herbertiana.</i>  |
| <i>E. angusta (rigidula).</i>   | <i>E. Howittiana.</i>   |
| <i>E. annulata.</i>   | <i>E. hybrida.</i>  |
| <i>E. argillacea.</i>   | <i>E. intertexta.</i>   |
| <i>E. Boormani.</i>   | <i>E. Isingiana.</i>  |
| <i>E. brachyandra.</i>  | <i>E. Jutsoni.</i>  |
| <i>E. Brownii.</i>  | <i>E. Kybeanensis.</i>  |
| <i>E. cæsia.</i>  | <i>E. Lane-Poolei.</i>  |
| <i>E. calycogona.</i>   | <i>E. Laseroni.</i>   |
| <i>E. Campaspe.</i>   | <i>E. lirata.</i>   |
| <i>E. Cliftoniana.</i>  | <i>E. micranthera.</i>  |
| <i>E. coccifera.</i>  | <i>E. Mundijongensis.</i>   |
| <i>E. collina.</i>  | <i>E. notabilis.</i>  |
| <i>E. Comitæ-Vallis.</i>  | <i>E. Nowraensis.</i>   |
| <i>E. confluens.</i>  | <i>E. Oldfieldii.</i>   |
| <i>E. corrugata.</i>  | <i>E. orbifolia.</i>  |
| <i>E. crucis.</i>   | <i>E. pachyphylla.</i>  |
| <i>E. Cullenii.</i>   | <i>E. pallidifolia.</i>   |
| <i>E. decorticans.</i>  | <i>E. Parramattensis.</i>   |
| <i>E. diptera.</i>  | <i>E. patellaris.</i>   |
| <i>E. doratoxylon.</i> (Are the flowering specimens on the mature leaves ?)   | <i>E. phænicea.</i>   |
| <i>E. Dundasi.</i>  | <i>E. Pimpiniana.</i>   |
| <i>E. Ebbanoensis.</i>  | <i>E. ptychocarpa.</i>  |
| <i>E. eremophila.</i>   | <i>E. pyriformis.</i> (At an earlier stage.)                          |
| <i>E. falcata.</i>  | <i>E. pyriformis</i> var. <i>Kingsmilli</i> ( <i>E. Kingsmilli</i> ). |
| <i>E. fœcunda and loxophleba.</i> (Are they really different species ?)   | <i>E. Rudderi.</i>  |
| <i>E. Forrestiana.</i>  | <i>E. salmonophloia.</i>  |
| <i>E. fraxinoides.</i>  | <i>E. salubris.</i>   |
| <i>E. gomphocaphala.</i> (Desired at an earlier stage, and the same remark may be made of many species in this list.) | <i>E. sepulcralis.</i>  |
| <i>E. goniantha.</i>  | <i>E. Shiressii.</i>  |
| <i>E. grandis.</i>  | <i>E. Stowardi.</i>   |
|   | <i>E. tetraptera.</i> (At an earlier stage.)                          |
|   | <i>E. Umbrawarrensensis.</i>  |
|   | <i>E. Watsoniana.</i>   |
|   | <i>E. Woodwardi.</i>  |

## MATURE LEAVES.

*E. Kruseana* and *E. orbifolia* are given as examples. Of all species of which leanceolate leaves are unknown or sparingly known, it is desirable to be on the lookout for such. The matter has been stressed at Part LXVII, p. 353.

## BURSTING BUDS AND INFLORESCENCE IN GENERAL.

*E. Cliftoniana.*

*E. collina.*

*E. confluens.*

*E. diptera.*

*E. Dundasi.*

*E. Isingiana.*

*E. lirata.*

*E. longifolia* var. *multiflora.*

*E. Shirleyi.*

*E. Umbrawarrensii.*

Bursting buds are desired if possible, as these give the only definite shape of the bud, and also render fully developed anthers available. In some species it is true we have buds, but so immature as to fail to be characteristic.

## RIPE FRUITS AND SEEDS.

(Ripe fruits are already known in most cases, but as seeds are wanted in all cases, it seems desirable to send the fruits.)

*E. Abergiana.*

*E. adjuncta.*

*E. annulata.*

*E. aspera.*

*E. brachyandra.*

*E. clavigera.*

*E. Cliftoniana.*

*E. confluens.*

*E. cordata.*

*E. eremophila.*

*E. ferruginea.*

*E. gamophylla.*

*E. grandifolia.*

*E. Howittiana.*

*E. Jutsoni* (fruits unknown).

*E. micranthera*

*E. orbifolia*

*E. pachyphylla.*

*E. papuana.*

*E. patellaris.*

*E. peltata.*

*E. perfoliata.*

*E. phoenicea.*

*E. Pimpiniana.*

*E. ptychocarpa.*

*E. pyrophora.*

*E. Spenceriana.*



*E. CITRIODORA* Hook., Figs. 30, 31.

*E. EUDESMIOIDES* R.Br., Figs. 40, 40a.

*E. SPENCERIANA* Maiden, Figs. 43-45.

*E. TRACHYPHLOIA* F.v.M., Figs. 34-36. [See also Plates 4 and 268, Figs. 28a, 28b.]

*E. TETRODONTA* F.v.M., Figs. 41-42a, (41a magnified).



## EXPLANATION OF COLOURED PLATES.

## PLATE 5.

*E. citriodora* Hook.

30. (Ref. No. X125). Emu Park, Queensland (Andrew Murphy, 15th January, 1918). A young seedling, showing the slender hypocotyl, cotyledons, and the ovate, setose, non-peltate and peltate leaves. Sown 22nd January, 1918; drawn, 28th February, 1918.
31. Portion of the same plant,  $7\frac{1}{2}$  inches high, showing the lanceolate, peltate leaves. Drawn 14th November, 1918.

Seen 23rd December, 1919, height  $20\frac{1}{2}$  inches. Leaves  $4\frac{1}{2}$  inches long, still peltate and unchanged from drawing of 14th November, 1918.

*E. trachyphloia* F.v.M.

(See also Plate 4, fig. 37.)

- 34a. (Ref. No. A 1.) Gungal, near Merriwa (J. L. Boorman, November, 1914). A seedling 2 inches high showing the hypocotyl, rather small cotyledons, and six ovate, petiolate leaves. Sown 11th March, 1915; drawn 11th May, 1915.
34. (Ref. No. 15-812). Beta, Queensland (J. L. Boorman, August, 1912). Tip of a plant 2 feet 6 inches high, showing the purple-brown seta on the stem, and also on the lanceolate, peltate leaves, one of which is 10 cm. long and 2 cm. broad. The leaves are paler on the undersurface than on the upper surface. Sown 19th August, 1912; drawn 12th March, 1914.
35. (Ref. No. 16-812.) Bundaberg, Queensland (J. L. Boorman, July, 1912). Upper portion of a seedling 12 inches high, showing the setose stem and the alternate, narrow lanceolate, peltate leaves. Sown 16th August, 1912; drawn 18th April, 1913.
- 35a. Portion of leaf of the same plant, showing the back and the slightly revolute margins.
36. Same particulars as 35. Showing a young seedling, with two rather large cotyledons and the first pair of leaves. Sown 16th August, 1912; drawn 17th October, 1912.

*E. eudesmioides* R.Br.

- 40a. (Ref. No. B 10.) Minginew, Western Australia (J. H. Maiden, 1909). A young seedling in the first stage, showing the slender, highly coloured hypocotyl and cotyledons. Sown 23rd December, 1914; drawn 12th January, 1915.
40. The same plant at  $6\frac{1}{2}$  inches high, still showing the cotyledons with the elongated petioles, the broad, crinkled, slightly setose, opposite, ovate leaves, of which four pairs are opposite.

*E. tetradonta* F.v.M.

- 41a. (Ref. No. 1004.) Port Darwin, Botanic Gardens, February, 1905. A seedling in the early stages, showing the long, smooth, green hypocotyl, the broad cotyledons, and the first pair of leaves. Sown 3rd February, 1905; drawn 6th March, 1905.



41. Same particulars as 41a. A seedling from the same sowing in a more advanced stage than 41a, showing the first and subsequent pairs of linear oblong, slightly dentate leaves.
41. A leaf of 41 magnified to show the minute dentate, setose denticulations along the margins, and a little seta on the stem.
- 42a. (Ref. No. 112 H.H.) Darwin, Northern Territory (C. E. F. Allen). A more delicate seedling than 41a. Sown 3rd February, 1920; drawn 8th March, 1920.
42. Same particulars as 42a, but resown during 1921. Showing a seedling 4 inches high, with the cotyledons still attached and five pairs of narrow lanceolate, petiolate leaves.

*E. Spenceriana* Maiden.

43. (Ref. No. 448). Stapleton, Northern Territory (G. F. Hill, 2nd October, 1916). A seedling showing the submerged hypocotyl, cotyledons and two pairs of leaves. Sown 13th December, 1917; drawn 16th January, 1918.
44. (Same particulars as 43.) A more advanced seedling, with three pairs of opposite, linear leaves. Drawn 28th January, 1918.
45. (Same particulars as above.) A young seedling, 3 inches high, with the cotyledons still attached and showing seven pairs of opposite, linear, lanceolate leaves and two alternate leaves. Drawn 14th March, 1918.

PLATE 6.

*E. amygdalina* Labill.

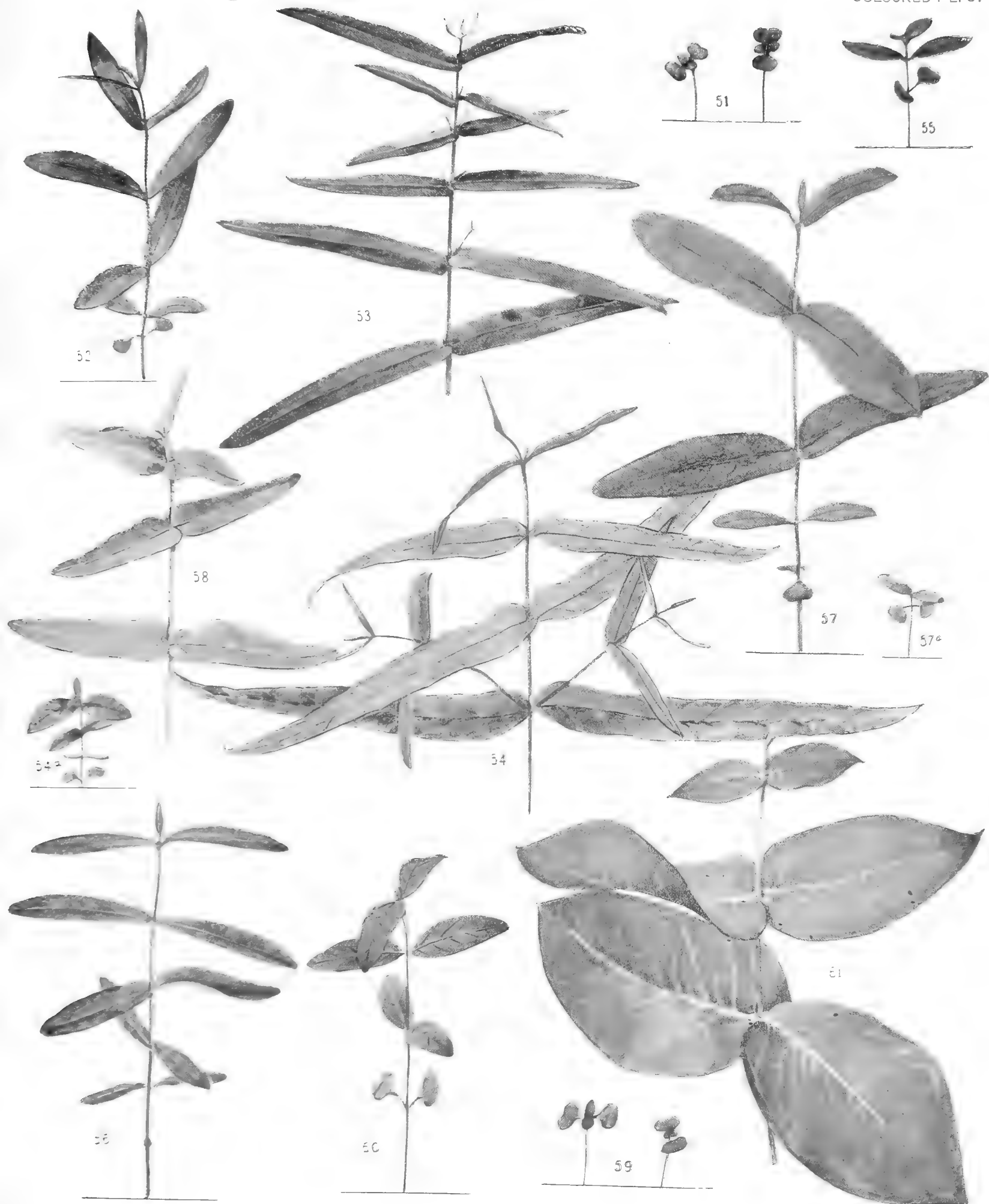
51. (Ref. No. 203.) Hobart, Tasmania (L. Rodway, December, 1917). Young seedlings, showing the rather long filiform hypocotyl, broadish cotyledons, and the first pair of leaves in a rudimentary state. Sown 7th May, 1918; drawn 19th June, 1918.
52. One of the above seedlings, 3½ inches high, with the cotyledons still attached, and five pairs of opposite shortly petiolate to sessile leaves and the glandular internodes. Drawn 14th October, 1917.
53. Portion of the same plant at 19½ inches high, showing the lower pair of leaves still opposite, while the upper five pairs are alternate and still sessile. Drawn 24th November, 1919.

*E. radiata* Sieb.

- 54a. (Ref. No. A 71.) Mount Wilson, N.S.W. (J.H.M., September, 1914). A seedling about 1 inch high, showing the abbreviated hypocotyl, small cotyledons, the very narrow first pair of leaves, and the broader subsequent pairs. Sown 26th March, 1915; drawn 13th September, 1915.
54. Upper portion of a plant 9½ inches high, from the same locality as 54a, collected January, 1902, showing the long, narrow-lanceolate, shortly petiolate opposite leaves and the branching habit. Sown 11th March, 1915; drawn 20th January, 1916.

*E. numerosa* Sieb.

55. (Ref. No. 57.) Bent's Basin, Nepean River (J. L. Boorman and E. Cheel, 1913). A seedling about 1 inch high, with a rather long hypocotyl, with the cotyledons attached, and the first pair of leaves well developed. Sown 22nd September, 1913; drawn 12th November, 1913.



*E. AMYGDALINA* LABILL., Figs. 51-53.  
*E. NUMEROSA* MAIDEN, Figs. 55-57a.  
*E. DIVES* SCHAU., Figs. 59-61.

*E. RADIATA* SIEB., Figs. 54, 54a.  
*E. SMITHII* R. T. BAKER, Fig. 58.





*E. NICHOLI* MAIDEN and BLAKELY,  
Figs. 62-64.

*E. CREBRA* F.v.M., Figs. 70-74.

*E. FRUTICETORUM* F.v.M., Figs. 65-69.

*E. SIDEROXYLON* A. CUNN., Figs. 75-77.



56. The same plant as 55 at  $3\frac{1}{2}$  inches high, showing the arrangement of the leaves, all growing in the same plane, except the second pair. It will be noted that the lower pair are petiolate, while the four upper pairs are closely sessile and slightly channelled. Drawn 21st January, 1914. The same plant seen at 33 inches high was still in the opposite-leaved stage, with the leaves as depicted in fig. 56.
57. (Ref. No. A 4.) Cobbity Bridge (J.H.M., 28th November, 1914). A seedling 4 inches high, with the cotyledons still attached, and with four pairs of opposite leaves, and the upper internode slightly glandular. Sown 30th November, 1914; drawn 16th February, 1915.
- 57*a*. The same as 57, but in the earlier stage. Sown 30th November, 1914; drawn 14th January, 1915.

*E. Smithii* R. T. Baker.

58. (Ref. No. A 30.) Wingello, N.S.W. (J. L. Boorman, 1913). The upper portion of a plant  $6\frac{1}{2}$  inches high, showing the glaucous character, the opposite, sessile, lanceolate leaves, and the slightly glandular internodes. Although it is a member of the Bilobæ, it shows a striking affinity to three of the Reniformæ on the same plate. The anthers of *E. Smithii* are also different from those of *E. amygdalina*, *E. numerosa*, and *E. radiata*. Sown 3rd December, 1914; drawn 1st March, 1915.

*E. dives* Schau.

59. (Ref. No. B 85.) Cooma, N.S.W. (J. L. Boorman, December, 1914). Two seedlings, showing the slender hypocotyl and the cotyledons. Sown 13th October, 1915; drawn 15th November, 1915.
60. One of the above plants about 3 inches high, showing the elongated hypocotyl, cotyledons, and three pairs of broadish, shortly petiolate leaves. Drawn 13th January, 1916.
61. (Ref. No. X 73.) Wingello, N.S.W. (A. Murphy). Tip of a plant 25 inches high, showing the broad, opposite, sessile leaves, and the glaucous character of the young plant. Drawn 14th January, 1920.

PLATE 7.

*E. Nicholi* Maiden and Blakely.

62. (Ref. No. B 76.) 18 miles west of Walcha, N.S.W. (R. H. Cambage, 19th March, 1913). Seedling with one pair of cotyledon leaves and three pairs of opposite linear first leaves (one of the middle pair dropped off). Sown 11th March, 1915; drawn 22nd April, 1915.
63. (Same particulars as No. 62, but drawn 3rd June, 1915.) Seedling with cotyledon leaves dropped off, and eight pairs of opposite first leaves varying from linear to almost linear ob-lanceolate.
64. (Same particulars as No. 62, but drawn 27th January, 1916.) Seedling, neither hypocotyl nor ground-line shown. The first leaves elongated, all linear or nearly so. All alternate, eleven on one side of the rachis, and fourteen on the other, two or three of the leaves having fallen off.

*E. fruticetorum* F.v.M.

65. (Ref. No. X 23.) Wyalong, N.S.W. (R. H. Cambage, 2nd December, 1917). Seedling, with two cotyledon leaves and two pairs of very young, opposite, very shortly petiolate, ob-lanceolate leaves. Sown 12th December, 1917; drawn 7th February, 1918.

The same seedling (8 cm. high) drawn 14th June, 1918, has the scars of a pair of cotyledon leaves and the first pair of seedling leaves. Then we have two more pairs of opposite first leaves and five pairs of alternate ones, more or less opposite.

A more robust seedling (16 cm. high) drawn on the same day as that referred to in the previous paragraph, has all the parts correspondingly enlarged.

Seen again on 27th January, 1920, this seedling was 2 ft.  $2\frac{1}{2}$  inches high, when it was identical with a photograph of X 23 and also X 151.

66. (Ref. No. X 47.) Wyalong, N.S.W. (J. L. Boorman, November, 1917). Seedling with one pair of cotyledon leaves, then six pairs of opposite, narrow-lanceolate leaves, the bases tapering into short petioles, then three smaller, young alternate leaves. Sown 15th December, 1917; drawn 25th March, 1918.
67. (Particulars the same as No. 65, except drawn 17th October, 1918.) An alternate, intermediate, lanceolate leaf, taken from a seedling  $9\frac{1}{2}$  inches in height.
68. (Ref. No. 1 B.) (Same particulars as No. 66, except sown 28th November, 1917, and drawn 27th January, 1920. This large, lanceolate, intermediate leaf was drawn 4 inches from the top of a seedling whose height was 1 ft. 11 in. As a seedling No. 68 agreed throughout with X 47. On 15th April, 1919, it was 1 ft. 3 in. high.

Seedlings bearing the reference numbers 1 B, X 23 and X 47 were from time to time compared, and found to be practically identical.

69. (Same particulars as No. 66, except that it was drawn 16th April, 1919). Seedling height 15 inches; portion with alternate, mature leaves.

No. 69 was seen on 27th January, 1920, when it was 2 ft 1 in. high, and it was not to be distinguished from X 151.

#### *E. crebra* F.v.M.

70. (Ref. No. 75 H.H.) Eidsvold, Queensland (Dr. T. L. Bancroft, 10th March, 1919). Two seedlings, showing hypocotyls and cotyledon leaves. Sown 5th May, 1919; drawn 27th May, 1919.
- 70a. (Ref. No. A 5.) Theresa Park to Werombi, Camden district, N.S.W. (J.H.M.). Seedling with pair of cotyledon leaves and two pairs of first leaves, the undersides of all of which are purple. Sown 30th November, 1914; drawn 4th January, 1915.

Other sowings of 70a agree with the seedlings of 71a (Ref. Nos. A 54 and A 77).

71. Same particulars as No. 70. Seedling with one pair of cotyledon leaves and three pairs of opposite petiolate, narrow-lanceolate, first leaves. Drawn 6th August, 1919.

Another seedling, with same particulars as No. 71, is more robust, is 6 cm. high, has four pairs of broader leaves and larger cotyledon leaves.

- 71a. Murrumbidgee, Western N.S.W. (Andrew Murphy, 1903). Sown 6th June, 1905; drawn 15th September, 1905. On 9th November, 1905, this seedling was 20 cm. high, with a deep purple shade (not observed in the younger plants) on the undersides of the leaves.
72. Same particulars as preceding, except that it was drawn on 4th September, 1919, and was in vigorous growth, with leaves 5 cm. long and height 1 dm.

*E. BICOLOR* A. CUNN., Figs. 78-80.*E. MICROTHECA* F.V.M., Figs. 81-82a.*E. HEMIPHLOIA* F.V.M., Figs. 83-85.*E. CAMBAGEANA* MAIDEN, Figs. 86a, 86b.*E. MELLIODORA* A. CUNN., Figs. 83-84.





73. Same particulars as the preceding. Broadish leaf, 14 cm. long. Drawn 24th December, 1919, taken 7 inches from the ground-line from a plant 10 inches high.
74. Same particulars as the preceding. Leaf narrower than the preceding, 13 cm. long. Drawn 15th December, 1920 (<sup>2</sup> 1919), taken 1 foot from the ground line, from a plant 1 ft. 7 inches high.

*E. sideroxylon* A. Cunn.

75. (Ref. No. X 101.) Merindee, N.S.W. (Andrew Murphy, 21st January, 1918). Seedling with two cotyledon leaves and four pairs of petiolate lanceolate first leaves. Sown 22nd January, 1918; drawn 23rd April, 1918.
- 75a. (Ref. No. 1003). Stuart Town, Western N.S.W. (Andrew Murphy, 1903). Seedling with one pair of cotyledon leaves and two pairs of petiolate lanceolate leaves; deep purple shade on the under-sides. Sown 5th February, 1904; drawn 29th March, 1904.
76. Same particulars as No. 75. Upper portion of seedling drawn 4th November, 1918, from a plant 10½ inches high.
77. Same particulars as No. 75. Leaf drawn 28th April, 1920, from a seedling 2 ft. 2 in. high.

PLATE 8.

*E. bicolor* A. Cunn.

78. Bourke N.S.W. (J. L. Boorman, February, 1901). Two seedlings in the first stage, showing the cotyledons. Sown 6th June, 1905.
79. Same particulars as No. 78. A more advanced seedling, showing the cotyledons and three pairs of opposite, narrow-lanceolate leaves. Drawn 25th September, 1905.
80. Same particulars as above. A seedling, 5½ inches high, showing 6 pairs of opposite, lanceolate leaves and two lanceolate falcate leaves in the alternate stage. The two lowest pairs are more sessile than the others. Drawn 5th February, 1906.

*E. Cambageana* Maiden.

- 80a. (Ref. No. C 1.) Emerald, Queensland, August, 1912. Three seedlings in various stages of development, showing the hypocotyl, cotyledons, first and subsequent pairs of leaves, which range from narrow to broad lanceolate. Sown 4th January, 1915; drawn 8th March, 1915.
- 80b. Same particulars as 80a. Upper portion of a seedling 9 inches high, showing the broad, somewhat rigid, and more or less venulose, lanceolate leaves. Drawn 5th May, 1915.

*E. microtheca* F.v.M.

81. Bourke (J. L. Boorman, January, 1902). A seedling, showing the short hypocotyl and two pairs of opposite leaves. Sown 6th June, 1905; drawn 20th September, 1905.
82. Upper portion of 81, at about 9 inches high, showing the lanceolate, slightly glaucous, and somewhat triplinerved alternate leaves. Drawn 9th November, 1905.
- 82a. (Ref. No. A 15.) Bourke (Andrew Murphy, 1910). Showing a seedling with the cotyledons attached and the first and second pairs of leaves. Sown 3rd December, 1913; drawn 14th January, 1914.

*E. hemiphloia* F.v.M.

85. (Ref. No. 6.) Canley Vale, N.S.W. (W. Forsyth, July, 1902). A young seedling, 5 cm. high, showing the cotyledons and three pairs of narrow, opposite leaves. Sown 26th November, 1917; drawn 15th February, 1918.

The same plant was drawn at  $7\frac{1}{2}$  inches (not reproduced here), the upper leaves of which are a rich purple brown. The four lower alternate leaves are a rich dark green and broadly lanceolate, with the lower portion of the intramarginal nerves well removed from the edge, varying from 5 to 10 cm. long and 3 to  $3\frac{1}{2}$  cm. broad. At 1 ft. 5 in. high it was still unchanged, except that the leaves were slightly broader and longer.

86. (Ref. No. A 3). Teresa Park, N.S.W. (J. H. Maiden). A young seedling, 7 cm. high, with broader leaves than No. 85. Sown 30th November, 1914; drawn 16th February, 1915.
87. Upper portion of No. 86 at 10 inches high, showing the typical intermediate leaves of the species and the purple-brown, slightly flexuose stem. Drawn 14th April, 1915.

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales" \* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets :—

- |   |  |
|---|--|
| <i>acacioides</i> A. Cunn. (xlviii).                        | <i>melliodora</i> A. Cunn. (ix).                 |
| <i>acmenioides</i> Schauer (xxxii).                         | <i>microcorys</i> F.v.M. (xxxviii).              |
| <i>affinis</i> Deane and Maiden (lvi).                      | <i>microtheca</i> F.v.M. (lii).                  |
| <i>amygdalina</i> Labill. (xvi).                            | <i>Muelleriana</i> Howitt (xxx).                 |
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| <i>Baueriana</i> Schauer (lvii).                            | <i>odorata</i> Behr and Schlectendal (xli).      |
| <i>Baueriana</i> Schauer var. <i>conica</i> Maiden (lviii). | <i>oleosa</i> F.v.M. (lx).                       |
| <i>Behriana</i> F.v.M. (xlvi).                              | <i>paniculata</i> Sm. (viii).                    |
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| <i>Boormani</i> Deane and Maiden (xlv).                     | <i>piperita</i> Sm. (xxxiii).                    |
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| <i>capitellata</i> Sm. (xxviii).                            | <i>populifolia</i> Hook. (xlvii).                |
| <i>conica</i> Deane and Maiden (lviii).                     | <i>propinqua</i> Deane and Maiden (lxi).         |
| <i>Consideniana</i> Maiden (xxxvi).                         | <i>punctata</i> DC. (x).                         |
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| <i>corymbosa</i> Sm. (xii).                                 | <i>regnans</i> F.v.M. (xviii).                   |
| <i>crebra</i> F.v.M. (liii).                                | <i>resinifera</i> Sm. (iii).                     |
| <i>Dalrympleana</i> Maiden (lxiv).                          | <i>robusta</i> Sm. (lxviii).                     |
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| <i>dumosa</i> A. Cunn. (lxv).                               | <i>rubida</i> Deane and Maiden (xliii).          |
| <i>eugenoides</i> Sieber (xxix).                            | <i>saligna</i> Sm. (iv).                         |
| <i>fruticetorum</i> F.v.M. (xlii).                          | <i>siderophloia</i> Benth. (xxxix).              |
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\* Government Printer, Sydney. 4to. Each part contains 4 plates and other illustrations.

NOTE BY GOVERNMENT PRINTER.

Financial conditions have so largely affected publications that it is no longer possible to continue the issue of "The Forest Flora of New South Wales" at the old rates, and from this date onward, *i.e.*, from and including Part 7, Vol. VII, the price of the individual Parts will be raised to 2s. 6d. each.

For those Parts already published the old sale price will be adhered to, and subscriptions already received will not be disturbed, but the new subscription rate of 2s. 6d. per part, or 25s. for 12 parts, will come into effect as from the 1st July, 1921.

Sydney: Alfred James Kent, I.S.O., Government Printer—1920.

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300. x *E. insizwaensis* Maiden n.sp.

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11. Microscopic Characters of Bark.  
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15. Fibre in Bark.  
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305. x *E. Forsythii* Maiden n.sp.  
306. x *E. Auburnensis* Maiden n.sp.  
307. x *E. Yagobieii* Maiden n.sp.  
308. x *E. Blackburniana* Maiden.  
309. x *E. Studleyensis* Maiden n.sp.

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312. *E. Kayseri* R. M. Johnston.  
313. *E. Milligani* R. M. Johnston.  
314. *E. Delftii* Ettingshausen.  
315. *E. Diemenii* Ettingshausen.  
316. *E. Hayi* Ettingshausen.  
317. *E. Houtmanni* Ettingshausen.  
318. *E. Mitchelli* Ettingshausen.  
319. *E. cretacea* Ettingshausen.  
320. *E. Davidsoni* Ettingshausen.  
321. *E. Oxleyana* Ettingshausen.  
322. *E. scotophylla* Ettingshausen.  
323. *E. Warraghiana* Ettingshausen.  
324. *E. praecoriacea* Deane.  
325. *E. Hermani* Deane.  
326. *E. Howitti* Deane.  
327. *E. Kitsoni* Deane.  
328. *E. Suttoni* formerly *E. Muelleri* Deane.  
329. *E. Chapmani* formerly *E. Woollii* Deane

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H.—*E. borealis* Heer.  
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J.—*E. dubia* Ettingshausen.  
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Q.—*E. (?) nervosa* Newberry.  
R.—*E. (?) parvifolia* Newberry.  
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333. *E. angusta* n.sp.  
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354. *E. Schlechteri* Diels.  
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28. *E. virgata* Sieb.  
46. *E. acacioides* A. Cunn.  
56. *E. Naudiniana* F.v.M.  
59. *E. Caleyi* Maiden.  
64. *E. Baueriana* Schauer.  
75. *E. falcata* Turcz.  
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201. *E. radiata* Sieb.  
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# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

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(Lately Government Botanist of New South Wales and Director of the  
Botanic Gardens, Sydney).

VOL. VIII. PART 5.



PART LXXV OF THE  
COMPLETE WORK  
(WITH FOUR COLOURED PLATES)

PRICE THREE SHILLINGS AND SIXPENCE

*Published by Authority of*

THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney:

ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER.

1931.



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28. *E. virgata* Sieber.  
29. *E. apiculata* Baker and Smith.  
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99. *E. Maidenii* F.v.M.  
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# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

(Lately Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

---

The author of this standard work, Mr. J. H. Maiden, I.S.O., F.R.S., F.L.S., died on 16th November, 1925, at the age of 66 years.

It is most regrettable that he did not live to see the completion of his great work, of which 65 Parts have already appeared, and the final Parts were prepared by him for publication prior to his death.

With the kind permission of Dr. Darnell-Smith, Director, Botanic Gardens, Sydney, this and the subsequent Parts will be edited by Messrs. R. H. Cambage, C.B.E., F.L.S., and W. F. Blakely, Assistant Botanist, Botanic Gardens, both of whom have been in constant touch with the late Mr. Maiden during the progress of the work.

## VOL. VIII. PART 5. Part LXXV of the Complete Work.

(WITH FOUR PLATES.)

---

*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

---

PRICE THREE SHILLINGS AND SIXPENCE.

*Published by Authority of*  
THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

Sydney:

ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER, PHILLIP-STREET.



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## DETAILED DESCRIPTION OF SEEDLINGS.

### DIVISION BILOBÆ.

#### SERIES.

1. Linear, incurved short; 8 or more pairs opposite
2. Linear-flexuose, long; 4-5 pairs opposite.
3. Linear to narrow-lanceolate; 5-6 pairs opposite. (Allied to No. 2.)
4. Brevi-lanceolate, triplinerved; 4-6 pairs opposite. (Allied to No. 5.)
5. Broad, glaucous, triplinerved; 4-5 pairs opposite.
6. Lanceolate to broad-lanceolate; 4-6 pairs opposite.
7. Peach-tree like, pale green; 6 pairs opposite.
8. Orbicular, petiolate, triplinerved, glaucous; 2-3 pairs opposite.
9. Ovate to broadly-elliptical, venulose; 1-3 pairs opposite.
10. Hypericum-like; 5-6 pairs opposite.
11. Small, oblong to lanceolate, usually obtuse; 1-5 pairs opposite.
12. Glaucous, quadrangular and somewhat rigid. (Affinity to No. 11.)
13. Short, petiolate, small, elliptical to oblong, dark green, glandular; 3-4 pairs opposite.
14. Cordate (small); 4-5 pairs opposite.
15. Perfoliate, glaucous.
16. Sessile to stem-clasping, glaucous or pruinose. Number of pairs indefinite.
17. Sessile, narrow-lanceolate to elliptical, spreading, stem-clasping, number of pairs indefinite.

The characters of the five species of this series are fairly uniform.

This series connects with No. 18, but they are not angular.

18. Sessile, lanceolate, quadrangular, glaucous. Number of pairs indefinite.
19. Short, broadish, Hypericum-like (See Series 10); 6-7 pairs or more opposite.
20. Narrow, semi-rigid; 6 pairs at least opposite.
21. Narrow-lanceolate; 4-6 pairs opposite.
22. Narrow-oblong to attenuate lanceolate falcate; 3-6 pairs opposite.
23. Semi-terete to quadrangular, petiolate, elliptical to orbicular; 3-8 pairs opposite.
24. Stems quadrangular.
25. Longifolia (called after a well-known species); 4-5 pairs opposite.
26. Fine parallel venation; 4-6 pairs opposite.

## Series 1.—Linear, incurved, short.

*E. Nicholii.*

*General Appearance.*—Cotyledons small; eight or more pairs of leaves opposite. The narrowest of the Bilobæ. Resembles the linear phyllode species of *Acacia*. Leaves dark to light green, some tipped with brown, ranging from linear-spathulate to linear-falcate. Stems yellowish-green to pink.

- (1) *Hypocotyl*, length medium.
- (1a) *Hypocotyl* (Miss Flockton), terete, wiry, red.
- (2) *Cotyledons* (Petiole, taper), medium, not tapering.
- (2a) *Cotyledons* (Undersurface, Miss Flockton), tinted pink.
- (3) *Stem* (Miss Flockton), terete, red warty glands.
- (4) *1st Pair of Leaves*, petiolate, linear lanceolate, glabrous. (Undersurface, Miss Flockton), pale green.
- (5) *Subsequent Pairs of Leaves* (Number, shape, vestiture). Eight (or more), linear-lanceolate, erect, incurved, narrowed into the petiole, glabrous, dark to light green. Venation obscure.
- (6) *Intermediate Leaves*, linear-spathulate to linear-lanceolate, semi-rigid, more or less curved, ranging from 2 cm. by 2 mm., to 4 cm. by 2 mm., dark to light green.

## Series 2.—Linear-flexuose, long.

*E. acacioides.*      *E. fruticetorum.*

*General Appearance.*—Cotyledons small, 4–5 pairs of leaves opposite. Leaves dark to light yellowish-green, shaded purple-brown, ranging from linear-spathulate to linear-lanceolate, and in the last stage of linear-flexuose or linear-falcate. Stems green or pink. It will be observed that these two species are remarkably similar in their seedling characters.

- (1) *Hypocotyl*.

*E. acacioides*      }  
*E. fruticetorum*    } Medium to long.

- (1a) *Hypocotyl* (Miss Flockton).

*E. acacioides*, terete, red (Wyalong XI, and Warialda); terete, spindly, red (Wyalong, 51).

*E. fruticetorum*, terete, red (Wyalong, X 47); terete, frail, red (Wyalong 1 B and X 23).

(2) *Cotyledons* (Petiole, taper).*E. acacioides*, short, tapering, emarginate.*E. fruticetorum*, short, tapering, emarginate.(2a) *Cotyledons* (Undersurface, Miss Flockton).*E. acacioides*, green (Wyalong X 1, X 51 and Warialda).*E. fruticetorum*, green (Wyalong 47, 1 B, and X 23).(3) *Stem* (Miss Flockton).*E. acacioides*, terete, becoming a little angular, glands small (Wyalong X 1); terete, a few glands (Wyalong X 51); angular with protuberant warty glands (Warialda).*E. fruticetorum*, angular, with glands (Wyalong 1 B); terete with glands (Wyalong X 23).(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

<i>E. acacioides</i>	} Petiolate, narrow-lanceolate, glabrous.
<i>E. fruticetorum</i>	

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).*E. acacioides*, four, narrow-lanceolate, somewhat rigid, glabrous, dark green.*E. fruticetorum*, four, narrow-lanceolate, somewhat rigid, veins more or less distinct, glabrous, dark green to yellowish-green.(6) *Intermediate Leaves*.*E. acacioides*, linear, slightly flexuose, dark to light green; at 8½ inches (22 cm.), 10 cm. by 3 mm.*E. fruticetorum*, narrow-lanceolate, slightly curved to linear oblong, and of a light yellowish-green, changing at 9½ inches (24 cm.) to narrow-lanceolate, 7 by 1 cm.

## (6a) (Miss Flockton).

*E. acacioides*.*1st leaves* very small, linear. *Leaves* long and narrow, inclined to be spatulate (Wyalong 1).*1st leaves* ovate-lanceolate, underside pale green (Wyalong 51).*1st leaves* small lanceolate. *Leaves* alternate, linear, more than 3 inches long, the plant being 8 inches high (Warialda).*E. fruticetorum*.*1st leaves* small, ovate or lanceolate petiolate. *Leaves* lanceolate (Wyalong 47).*1st leaves* lanceolate, petiolate (Wyalong 1 B).*1st leaves* very small ovate, petiolate. *Leaves*, the lower ones narrow-ovate, later linear, petiolate, undersurface paler green (Wyalong 23).



### Series 3.—Linear to narrow-lanceolate.

<i>E. Staigeriana.</i>	<i>E. sideroxylon.</i>
<i>E. decorticans.</i>	<i>E. bicolor.</i>
<i>E. crebra.</i>	<i>E. microtheca.</i>
<i>E. Normantonensis.</i>	

*General Appearance.*—Medium-sized cotyledons, 5–6 pairs of leaves opposite. Slender, virgate. Leaves linear to narrow-lanceolate, green to sub-glaucous, or tinged with red. Veins somewhat prominent. Stems green to pinkish. The three last species are broader than the others in the first stage.

I have not seen seedlings of *E. Cullenii*, but the following description of them is from the pen of Mr. R. H. Cambage. They probably come near *E. decorticans* and *E. crebra* :—

*Hypocotyl* terete, red 3 mm. to 1 cm. long, 1 mm. thick at base, glabrous.

*Cotyledons* obtusely quadrilateral to reniform, entire, 2·5–3 mm. long, 4–7 mm. broad, upperside green, underside red; petiole 3 mm. long.

*Stem* brownish-red in lower portion, brownish-green in upper part.

*Seedling foliage* opposite for about two or three pairs, entire, glabrous, linear; petiole 2–4 mm. First pair 1·6–2·4 cm. long, 1–2 mm. broad, upperside green, underside purple; leaves Nos. five to ten up to 5 cm. long, 2–3 mm. broad.

#### (1) *Hypocotyl.*

*E. Staigeriana*, short.

*E. decorticans*, short to long.

*E. crebra*, medium.

*E. sideroxylon*, medium.

*E. bicolor*, medium.

*E. microtheca*, short to medium.

*E. Normantonensis*, medium.

#### (1a) *Hypocotyl* (Miss Flockton).

*E. decorticans*, red (Eidsvold); terete, red, spindly (second sowing).

*E. crebra*, red (Murrumbidgee); terete, red (Eidsvold); terete, red, short and slight (Glenbrook); terete, wiry, red (near Dunedoo).

*E. sideroxylon*, red (Stuart Town); terete, red spindly (Merrindie); terete, reddish-brown, long and spindly (Wallangarra).

*E. bicolor*, tinted red (Bourke).

*E. microtheca*, short, smooth red (Bourke); red (second sowing).

*E. Normantonensis*, terete, shaded pink (Normanton).

(2) *Cotyledons* (Petiole, taper).

- E. Staigeriana*, emarginate, short, tapering.
- E. decorticans*, emarginate, long, tapering.
- E. crebra*, emarginate, long, tapering.
- E. sideroxylon*, emarginate, long, tapering.
- E. bicolor*, emarginate, short, tapering.
- E. microtheca*, slightly emarginate, medium, tapering.
- E. Normantonensis*, slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

- E. Staigeriana*, pale green (Cooktown).
- E. decorticans*, purple (Eidsvold).
- E. crebra*, red (Murrumbidgee, Eidsvold and Glenbrook); puce (Dunedoo).
- E. sideroxylon*, crimson (Stuart Town); green (Merrindie); red (Wallangarra).
- E. bicolor*, pink (Bourke).
- E. microtheca*, green (Bourke).
- E. Normantonensis*, green (Normanton).

(3) *Stem* (Miss Flockton).

- E. Staigeriana*, with slight pink tint (Cooktown).
- E. decorticans*, angular, shaded red (Eidsvold).
- E. crebra*, green, tinted red (Murrumbidgee); getting angular, red, smooth (Eidsvold); slightly angular (second sowing); at first terete, becoming angled red, (Glenbrook).
- E. sideroxylon*, red (Stuart Town); slightly tinted, red (Minore).
- E. bicolor*, with scattered oil glands (Bourke).
- E. microtheca*, shaded red, angular (Bourke).

(4) *1st pair of Leaves* (Petiole, shape, vestiture).

- E. Staigeriana*, petiolate, linear, glabrous.
- E. decorticans*, petiolate, linear-lanceolate, glabrous.
- E. crebra*, *E. sideroxylon*, *E. bicolor*, *E. microtheca* and *E. Normantonensis*, all as *E. decorticans*.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

- E. Staigeriana* eight linear to linear lanceolate, glabrous, light green.
- E. decorticans* four, narrow-lanceolate, glabrous, light green shaded red.
- E. crebra*, five, narrow-lanceolate, glabrous, light to yellowish-green.

*E. sideroxylon*, four, narrow-lanceolate, glabrous, light to olive green.

*E. bicolor*, four, narrow-lanceolate, glabrous, slightly glaucous.

*E. microtheca*, six, narrow-lanceolate, blunt, glabrous, slightly glaucous.

*E. Normantonensis*, five, narrow-lanceolate, blunt, glabrous, slightly glaucous, venation fine.

(6) *Intermediate Leaves.*

*E. Staigeriana*, narrow-lanceolate, dark green; at 6 inches (15 cm.), 3 cm. by 5 mm., stem green. Imperfect.

*E. decorticans*, narrow-lanceolate, slightly undulate, dark green shaded red; at 19½ inches (50 cm.), 8 cm. by 7 mm., stem reddish.

*E. crebra*, lanceolate, veins somewhat prominent, dark to yellowish green, midrib sometimes reddish; at 8 inches (21 cm.), 8 by 1 cm., stem pink or reddish.

*E. sideroxylon*, narrow to oblong-lanceolate, light yellowish green; at 10½ inches (27 cm.), 5 cm. by 5 mm.; at 26 inches, 6 by 2 cm. Stem green, shaded red.

*E. bicolor*, narrow-lanceolate, light glaucous green, shaded yellow; at 12 inches (31 cm.), 7 by 1½ cm., stem green.

*E. microtheca*, narrow-lanceolate, light glaucous green; at 7 inches (18 cm.), 7 by 1½ cm.; stem green.

*E. Normantonensis*, narrow lanceolate, light glaucous green, tips shaded yellowish green; at 8 inches (21 cm.), 6 by 1½ cm.; at 12 inches, 10 by 1½ cm.; stem green, shaded red.

(6a) (Miss Flockton).

*E. Staigeriana.*

*1st leaves* narrow linear. *1st alternate leaves* linear (Cooktown).

*E. decorticans.*

*1st leaves* lanceolate, undersurface purple shade. *1st alternate leaves* lanceolate or linear (Eidsvold).

*1st leaves* small, lanceolar, somewhat channelled (Eidsvold), second sowing.

*E. crebra.*

*1st leaves* linear, undersurface purple. *1st alternate leaves* the same, larger (Murrumbidgee).

*1st leaves* linear, *1st alternate leaves* narrow-lanceolate (Eidsvold).

*1st leaves* lanceolate; *1st alternate leaves* lanceolate, undersurface slightly paler (Eidsvold).

*1st leaves* small linear or lanceolate, later lanceolate, with red edges and midrib, the young growth with a purple tint on both sides, petiolate, decussate (Glenbrook).

*1st leaves* ovate, petiolate, undersurface puce tint (Dunedoo).

*E. sideroxylon.*

*1st leaves* linear or ovate-lanceolate, undersurface purple; *1st alternate leaves* linear (Stuart Town).

*1st leaves* lanceolate, petiolate, decussate. *Leaves* alternate, narrow-lanceolate, tapering at the base into a petiole. Very slightly paler on the undersurface (Merrindie).

*1st leaves* small, ovate petiolate (Wallangarra).

*1st leaves* linear; *1st alternate leaves* linear (Minore).

*E. bicolor.*

*1st leaves* lanceolate, undersurface pale green. *1st alternate leaves* the same, but larger (Bourke). Mature leaf very narrow, and 7 inches (18 cm.) long.

*E. microtheca.*

*1st leaves* ovate lanceolate (Bourke).

*1st leaves* ovate or lanceolate. *1st alternate leaves* lanceolate (Bourke, second sowing).

**Series 4.—Brevi-lanceolate, triplinerved.**

*E. conica.*

*E. melliodora.*

*E. Rareretiana.*

*E. rariflora.*

*E. populifolia.*

*E. Brownii.*

*E. microcarpa.*

*E. Cambageana.*

*E. ochrophloia.*

*E. hemiphloia.*

*E. odorata.*

*E. Blackburniana.*

*General Appearance.*—Cotyledons small to medium, 4–6 pairs of leaves opposite. Leaves light to yellowish green, triplinerved, with somewhat prominent veins, shortly lanceolate to lanceolate, long lanceolate when mature in some species. The intermediate leaves show the triplinerved character more than do the opposite ones. *E. hemiphloia* has the broadest leaves. Stems terete, smooth, except *E. Blackburniana*, green to pink or purple-brown. This species and *E. odorata* are the most glandular.

(1) *Hypocotyl.*

*E. conica* and *E. melliodora*, short to medium.

*E. Rareretiana*, *E. populifolia*, *E. rariflora*, and *E. Brownii*, medium.

*E. microcarpa* and *E. Cambageana*, short to long.

*E. ochrophloia* and *E. hemiphloia*, long.

*E. odorata* and *E. Blackburniana*, short to long.

(1a) *Hypocotyl* (Miss Flockton).

*E. conica*, short, tinted red (Gulgong); terete, red (Stanthorpe).

*E. melliodora*, terete, slightly tinted pink (Coonabarabran); terete, light brown (Grattai); red (Dubbo).

*E. Raveretiana*, thins abruptly into the root, crimson (Rockhampton, No. 1); terete, red (Rockhampton, No. 2).

*E. rariflora*, short, terete, red (Eidsvold, No. 1); terete, pinkish red (No. 2); terete, short, red (No. 3).

*E. populifolia*, smooth, red (Coolabah); terete, red (Pilliga).

*E. Brownii*, terete, red (Reid River).

*E. microcarpa*, terete, red, wiry (Dunedoo); rather short, pinkish brown (Stuart Town).

*E. Cambageana*, terete, red (Emerald).

*E. ochrophloia*, pink (Wanaaring).

*E. hemiphloia*, terete, red (Wallangarra); terete, red (Canley Vale); smooth, red (Theresa Park).

*E. Blackburniana*, tapering into the root, crimson (Inglewood, Victoria).

(2) *Cotyledons* (Petiole, taper).

*E. conica*, emarginate, short, tapering.

*E. melliodora*, *E. Raveretiana*, *E. rariflora*, *E. populifolia*, same as *E. conica*.

*E. Brownii* and *E. microcarpa*, slightly emarginate, short, tapering.

*E. Cambageana*, emarginate, short, tapering.

*E. ochrophloia*, slightly emarginate, short, tapering.

*E. hemiphloia*, emarginate, short, tapering.

*E. odorata* and *E. Blackburniana*, slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. conica*, green (Gulgong and Stanthorpe).

*E. melliodora*, green (Grattai); pink (Dubbo).

*E. Raveretiana*, purple (Rockhampton.)

*E. rariflora*, green (Eidsvold).

*E. populifolia*, green or mauve (Coolabah); green (Pilliga).

*E. Brownii*, green (Reid River).

*E. microcarpa*, pink (Dunedoo); purple; still attached to the plant at 6½ inches (Stuart Town).

*E. Cambageana*, green (Emerald).

*E. ochrophloia*, green (Wanaaring).

*E. hemiphloia*, pale green (Wallangarra); green (Canley Vale and Theresa Park).

*E. Blackburniana*, green (Inglewood, Vic.).

(3) *Stem* (Miss Flockton).

*E. conica*, terete, a little flattened, few glands, red (Gulgong).

*E. melliodora*, terete, becoming angular, green, shaded pink (Grattai).

*E. Raveretiana*, slightly angular, crimson (Rockhampton, No. 1), pale green from second leaves, angular. The stem with the alternate leaves is very angular, becoming almost winged (Rockhampton, No. 2).

*E. rariflora*, terete, red (Eidsvold, No. 1); terete, but becomes angular after the first three pairs of leaves (No. 2); terete, shaded pink (No. 3).

*E. populifolia*, terete, but getting angular, red, warty glands (Coolabah); getting angular (Pilliga).

*E. Brownii*, green, getting angular (Reid River).

*E. microcarpa*, with scattered warty glands (Stuart Town).

*E. ochrophloia*, becoming deep crimson (Wanaaring).

*E. hemiphloia*, angular, tinted red (Wallangarra); terete, weak, shaded from pink to green, a few depressed glands (Canley Vale); slightly angular, a few warty glands (Theresa Park).

*E. Blackburniana*, red, warty oil glands (Inglewood, Vic.).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. conica*, *E. melliodora*, *E. Raveretiana*, *E. rariflora*, *E. populifolia*, petiolate, oblong-lanceolate, glabrous.

*E. Brownii*, petiolate, lanceolate, glabrous.

*E. microcarpa*, *E. Cambageana* and *E. ochrophloia*, petiolate, oblong-lanceolate, glabrous.

*E. hemiphloia*, petiolate, lanceolate, glabrous.

*E. odorata* and *E. Blackburniana*, petiolate, lanceolate, rachis glandular.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. conica*, four (or more), short-lanceolate, slightly undulate, veins prominent, trinerved, glabrous.

*E. melliodora*, four, short-lanceolate, obtuse, veins prominent, trinerved, glabrous.

*E. Raveretiana*, three, short-lanceolate, veins scarcely prominent, trinerved, glabrous.

*E. rariflora*, three, short-lanceolate, veins distinct, trinerved, glabrous.

*E. populifolia*, three to four, short-lanceolate, veins prominent, trinerved, glabrous.

*E. Brownii*, four (or more), short-lanceolate, veins not prominent, trinerved, glabrous.

*E. microcarpa*, three to five, short-lanceolate, veins prominent, trinerved, glabrous.

*E. Cambageana*, three (or more), short-lanceolate, obtuse, veins prominent, trinerved, glabrous.

*E. ochrophloia*, three, short-lanceolate, obtuse, veins prominent, trinerved, glabrous.

*E. hemiphloia*, four, short-lanceolate, veins prominent, triplinerved, glabrous.

*E. odorata*, four, short-lanceolate, obtuse, slightly undulate, veins prominent, trinerved, rachis with few hairs or glands.

*E. Blackburniana*, four, short-lanceolate, obtuse to acute, some undulate, veins distinct, triplinerved, rachis glandular.

#### (6) *Intermediate Leaves.*

*E. conica*, broad lanceolate, obtuse to long-lanceolate, 4-7 cm. long, venulose, the broad ones usually triplinerved, yellowish green.

(The triplinerved character is caused by the intramarginal nerve being at some distance from the edge.)

*E. melliodora*, broad-lanceolate, obtuse to sometimes abruptly acute, to long-lanceolate, obtuse, 6-8 cm. long, with thin veins, usually triplinerved, glaucous to yellowish green.

*E. Raveretiana*, lanceolate, slightly undulate, veins scarcely prominent, usually triplinerved, light to yellowish green, the undersurface sometimes purplish.

*E. rariflora*, lanceolate to shortly lanceolate, and sometimes orbicular; at 10½ inches (27 cm.), 8½ cm. long, 2½ cm. broad; at 14½ inches, 6½ by 2½ cm., and at 21 inches (53 cm.), 4 by 3 cm., veiny, the broadest triplinerved, dark to yellowish green.

*E. populifolia*, lanceolate, undulate, strongly veined, trinerved, 4 by 1½ cm. long, olive green.

*E. Brownii*, oblong-lanceolate to lanceolate, 7½ by 2½ cm. long, veins scarcely distinct and scarcely trinerved, glaucous to yellowish green.

*E. microcarpa*, lanceolate, venulose, triplinerved; at 5½ inches (14 cm.), 4 by 1½ cm., and at 16½ inches (42 cm.), 8½ by 2½ cm., light to yellowish green.

*E. Cambageana*, lanceolate, obtuse, 4 by 1½ cm., veins somewhat distinct, trinerved, light green to yellowish green.

*E. ochrophloia*, short lanceolate to lanceolate, venulose, trinerved, ranging from  $2\frac{1}{2}$  by  $1\frac{1}{2}$  cm. to  $8\frac{1}{2}$  by  $2\frac{1}{2}$  cm., olive green, shaded purplish to yellowish green.

*E. hemiphloia*, broad-lanceolate, venulose, slightly undulate, triplinerved; at  $7\frac{1}{2}$  inches (19 cm.),  $7\frac{1}{2}$  by 3 cm. to 9 by 3 cm., olive to yellowish green. A specimen from Theresa Park, A. 3, at 10 inches (25 cm.), is elliptical-lanceolate, 6 by  $4\frac{1}{2}$  cm., venulose, trinerved, light to yellowish green. The Canley Vale specimen at  $21\frac{1}{2}$  inches (55 cm.) is oblong-lanceolate, venulose, 14 by  $3\frac{1}{2}$  cm., dark green. A specimen from Wallangarra, 74, at 11 inches (28 cm.), is elliptical-lanceolate, venulose, almost triplinerved  $10\frac{1}{2}$  by  $5\frac{1}{2}$  cm.

*E. odorata*, short-lanceolate, obtuse, venulose, trinerved, 4 by 2 cm., dark to yellowish green.

*E. Blackburniana*, almost elliptical-lanceolate, thick, veins not prominent, 3 by  $1\frac{1}{2}$  cm., glaucous to yellowish green. A specimen at  $6\frac{1}{2}$  inches (17 cm.), narrow lanceolate, trinerved, 6 by  $1\frac{1}{2}$  cm., stem glandular.

(6a) (Miss Flockton).

*E. conica.*

*1st leaves* linear, undersurface green. *1st alternate leaves* ovate-lanceolate and lanceolate. The tendency of the leaves is to become narrow (Gulgong).

*1st leaves* very small lanceolate or ovate, petiolate later, ovate, petiolate, undulate, thin, decussate (Stanthorpe).

*E. melliodora.*

*1st leaves* narrow-ovate to ovate-acuminate (Grattai).

*1st leaves* acuminate or lanceolate, undersurface pink tint. *1st alternate leaves* ovate (Dubbo).

*E. Ruvertiana.*

*1st leaves* ovate-lanceolate, undersurface purple. *1st alternate leaves* ovate-lanceolate, trinerved, undersurface pale green, a warm purplish tint on the young leaves and on the upper ones (Rockhampton, No. 1).

*1st leaves* linear, than ovate-lanceolate, undersurface purple (Rockhampton, No. 2).

*E. rariflora.*

*1st leaves* very small ovate to lanceolate, some quite ovate (Eidsvold, No. 1).

*1st leaves*, first three leaves lanceolate, changing to ovate. *Leaves* ovate (No. 2).

*1st leaves* narrow-ovate to ovate-acuminate, thin and trinerved (No. 3).

*E. populifolia.*

*1st leaves* ovate-acuminate. The more mature leaves are trinerved (Coolabah).

*1st leaves* lanceolate (Pilliga).



*E. Brownii.*

*1st leaves* ovate. *1st alternate leaves* lanceolate, pale opaque green on both sides (Reid River).

*E. microcarpa.*

*1st leaves* small, ovate or lanceolate, petiolate. *Leaves* ovate-petiolate (Dunedoo).

*1st leaves* ovate to ovate-lanceolate, undersurface green. *1st alternate leaves* almost rhomboidal, but very variable (Stuart Town).

*E. Cambageana.*

*1st leaves* ovate, undersurface green (Emerald).

*E. ochrophloia.*

*1st alternate leaves* narrow-lanceolate with deep red petioles, venation and colour of young leaves. Plant height  $17\frac{1}{2}$  inches (44 cm.), length of leaf  $4\frac{3}{4}$  inches (12 cm.).

*E. hemiphloia.*

(See coloured plate 8, Part LXXIV.)

*1st leaves* small lanceolate, later lanceolate, petiolate, undersurface paler green, decussate (Wallangarra).

*1st leaves* ovate petiolate, thin, undersurface pale green, drooping (Canley Vale).

*1st leaves* ovate-lanceolate, ovate, sinuous. *1st alternate leaves* broadly ovate, edges red, waved but not sinuous. The venation at the back of the leaf is red in some plants. Slightly paler green on the undersurface (Theresa Park).

*E. Blackburniana.*

*1st leaves* lanceolate and ovate-acuminate (Inglewood, Vic.).

**Series 5.—Broad, glaucous, triplinerved.**

(Elliptical deltoid to broad lanceolate.)

*E. albens.*

*E. affinis.*

*E. fasciculosa.*

*General Appearance.*—Cotyledons small to medium, 4–5 pairs of leaves opposite. Leaves glaucous or subglaucous, elliptical to broad lanceolate, veins prominent. Stems green to pinkish, terete, compressed at the nodes.

(1) *Hypocotyl.*

*E. albens* and *E. affinis*, medium to long.

*E. fasciculosa*, short.

(1a) *Hypocotyl* (Miss Flockton).

*E. albens*, terete, red, smooth (Hargraves); terete, inclined to be angular where the cotyledons come, tinted pink (Coonabarabran); terete, red (Mumbil).

*E. affinis*, red, thickening slightly to the root (Grattai, No. 1); terete, thin, red, (No. 2).

(2) *Cotyledons* (Petiole, taper).

*E. albens* and *E. affinis*, emarginate, short, tapering.

*E. fasciculosa*, small, slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. albens*, green (Hargraves); green or slightly tinted pink (Coonabarabran); green or pink (Mumbil).

*E. affinis*, faint tint of pink (Stuart Town); purple (Grattai, No. 1); slight mauve tint (Grattai, No. 2).

(3) *Stem* (Miss Flockton).

*E. albens*, terete up to the fourth pair of leaves, then flattening, purple-red, shiny (Hargraves); slightly angular, tinted red, a few glands (Mumbil).

*E. affinis*, red (Stuart Town); terete, some glands, shaded purple (Grattai).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. albens*, petiolate, sometimes very small, ovate or elliptical, glabrous.

*E. affinis*, petiolate, oblong-ovate, glabrous.

*E. fasciculosa*, petiolate, very small, ovate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. albens*, three, ovate to ovate-lanceolate, venulose, triplinerved, glaucous.

*E. affinis*, three, ovate to lanceolate, scarcely glaucous, venulose, triplinerved, glabrous.

*E. fasciculosa*, three (or more), at first very small, ovate to ovate-lanceolate, glabrous, but glaucous, venulose, triplinerved.

(6) *Intermediate Leaves*.

*E. albens*, orbicular, broad-lanceolate to almost deltoid, obtuse or apiculate,  $3\frac{1}{2}$  by 3 cm. to 8 by 8 cm., widest part, venulose, trinerved, glaucous. Sometimes they are more lanceolate than the above.

*E. affinis*, broadly and obtusely lanceolate to lanceolate, 6 by 4 cm. to 7 by 4 cm., venulose, triplinerved, glaucous to yellowish-green.

*E. fasciculosa*, ovate to ovate-elliptical, mucronate to broad-lanceolate and very acute, 3 by  $2\frac{1}{2}$  cm. to 8 by 4 cm., veins somewhat distinct, sometimes triplinerved, glaucous to yellowish-green.

(6a) (Miss Flockton).

*E. albens.*

*1st leaves* ovate, petiolate, undersurface paler green. *Leaves* broadly-ovate to orbicular, red venation, undersurface slightly paler green (Hargraves).

*1st leaves* broadly ovate, petiolate, decussate (Coonabarabran).

*1st leaves* ovate. *1st alternate leaves* ovate-acuminate, veins red (Mumbil).

*E. affinis.*

*1st leaves* linear, sometimes ovate. *1st alternate leaves* lanceolate.

*1st leaves* ovate, undersurface green. *1st alternate leaves* ovate-acute, undersurface green. Leaves on plant 31 inches (79 cm.) high, ovate, petiolate, undulate, very thick, distinct, pale venation, of a dark opaque blue-green, slightly paler beneath. (Grattai, No. 1).

*1st leaves* ovate, petiolate, decussate, undersurface light mauve (Grattai, No. 2).

### Series 6.—Lanceolate to broad-lanceolate.

*E. leucoxydon* (Series doubtful).

*E. Boormani.*

var. *macrocarpa* (see below).

*E. siderophloia.*

*E. paniculata.*

*General Appearance.*—Cotyledons small to medium, 4–6 pairs of leaves opposite. Leaves greenish, often blotched with purple-brown, narrow to broad-lanceolate, venation distinct, spreading. Stems terete, green to purple-brown.

(It is a matter for further consideration that *E. leucoxydon*, var. *macrocarpa*, might go into Series No. 5, although it is not distinctly triplinerved.)

(1) *Hypocotyl.*

*E. leucoxydon.* “Terete, glabrous, gradually tapering into the radicle, 6–9 mm. long.” (Lubbock.)

*E. leucoxydon*, short to long.

var. *macrocarpa*, short.

*E. paniculata*, medium.

*E. Boormani*, short.

*E. siderophloia*, long.

(1a) *Hypocotyl* (Miss Flockton).

*E. leucoxydon*, short, terete, red (Melton, Vic.).

var. *macrocarpa*, smooth, red (Port Lincoln).

*E. paniculata*, terete, tinted pink, slight (Benarkin, Q.); terete, red, spindly (Dungog); tinted pink (Wyong); short, red (Woy Woy); terete, shaded pink, slight (Ulladulla); terete, red (Bulladelah). Type of *E. Fergusoni*.

*E. Boormani*, slightly angular, tapers a little into the root (Penrith).

*E. siderophloia*, red, smooth, slightly angular (Morisset); terete, spindly, red (Rookwood); red (Stuart Town).

(2) *Cotyledons* (Petiole, taper).

*E. leucorylon*. "Cotyledons as in *E. rostrata*, but truncate at the end, or sometimes possessing a small apical tooth. 1.25–2 mm. long, 3–4.25 mm. wide; petiole tapered downwards, slightly grooved above, 1.75–2.5 mm. long." (Lubbock.)

*E. leucorylon*, emarginate, long, tapering, purple underneath.

var. *macrocarpa*, slightly emarginate, short, tapering, purple.

*E. paniculata*, slightly emarginate, long, tapering, purple.

*E. Boormani*, emarginate, short, tapering, purple.

*E. siderophloia*, emarginate, medium, tapering, purple.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. leucorylon*, green (Melton, Vic.).

var. *macrocarpa*, purple tint (Port Lincoln).

*E. paniculata*, green (Benarkin, Q., and Wyong); pale green (Dungog); green, or with faint tint of purple (Woy Woy); purple red (Ulladulla); slightly tinted pink (Bulladelah). Type of *E. Fergusonii*.

*E. Boormani*, red (Penrith).

*E. siderophloia*, red (Morisset); pale green (Rookwood).

(3) *Stem* (Miss Flockton).

*E. leucorylon*. "Square, glabrous, pale green or reddish, ultimately woody; 1st internode 4.5 mm. long, 2nd 5.5 mm., 3rd, 4.5 mm." (Lubbock.)

*E. leucorylon*, slightly angular, with warty glands (Melton, Vic.); crimson, with warty glands (Mount Lofty, S.A.).

var. *macrocarpa*, terete, red, covered in warty glands (Port Lincoln).

*E. paniculata*, angular, slightly shaded with pink (Benarkin, Q.).

*E. Boormani*, smooth, angular, slight tint of pink (Penrith).

*E. siderophloia*, angular, tinted purple (Morisset); smooth, angular, red (Rookwood); angular, shaded pink (Stuart Town).

"Leaves of *E. leucorylon* as in *E. globulus*, but oblong-lanceolate and petiolate; petioles tapering towards the base, channelled or grooved above. First pair narrowly oblong, obtuse, small, tapered to the base. Second and fourth pairs oblong-lanceolate, obtuse, tapering at both ends, but mostly at the base." (Lubbock.)

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. leucorylon*, petiolate, ovate to oblong-lanceolate, glabrous, rachis glandular.

var. *macrocarpa*, petiolate, ovate, glabrous.

*E. paniculata* and *E. Boormani*, petiolate, oblong to oblong-lanceolate, glabrous.

*E. siderophloia*, petiolate, lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. leucoxyton*, four (or more), short-lanceolate, shortly petiolate, veins somewhat distinct, light to dark green, glandular rachis.

var. *macrocarpa*, four (or more), lanceolate obtuse to broad-lanceolate, petiole longer than the typical form, veins distinct, light to dark green, glabrous.

*E. paniculata*, six, narrow to broad-lanceolate, obscurely veined, light to dark green tinged with purple-brown, glabrous.

*E. Boormani*, four (or more), broad-lanceolate, veins conspicuous, dark green, blotched with purple-brown, glabrous.

*E. siderophloia*, four (or more), broad-lanceolate, veins scarcely conspicuous, glaucous to dark green, blotched with purple-brown, glabrous.

(6) *Intermediate Leaves.*

*E. leucoxyton*, narrow-lanceolate, slightly undulate, 5 by  $1\frac{1}{2}$  cm., yellowish green.

var. *macrocarpa*, ovate-lanceolate, venulose, but scarcely triplinerved,  $4\frac{1}{2}$  by 4 cm. to 6 by  $5\frac{1}{2}$  cm., apiculate, yellowish-green, shaded pink.

*E. paniculata*, broad-lanceolate to narrow-lanceolate, finely veined (one specimen trinerved), ranging from 5 by  $2\frac{1}{2}$  cm., 7 by 4 cm. to 11 by  $3\frac{1}{2}$  cm., light green.

*E. Boormani*, broad-lanceolate, finely veined,  $6\frac{1}{2}$  by  $3\frac{1}{2}$  cm., light green.

*E. siderophloia*, elliptical-lanceolate to broad-lanceolate, more or less veiny, at 11 inches (28 cm.), 7 by 4 cm., yellowish green, at 14 inches (36 cm.), 12 by 6 cm., light green.

## (6a) (Miss Flockton.)

*E. leucoxyton.*

*1st leaves* lanceolate and ovate-lanceolate. *1st alternate leaves* lanceolate with red midrib and edges, undersurface slightly pale green (Melton, Vic.).

*1st leaves* ovate-lanceolate. This seedling is more than a year old, the leaves are still opposite,  $2\frac{1}{2}$  inches (6.5 cm.) long, broad, and without any petiole (Mount Lofty, S.A.).

var. *macrocarpa.*

*1st leaves* ovate. *1st alternate leaves* ovate-acuminate, midrib red, petiole warty glands (Port Lincoln).

*E. paniculata.*

*1st leaves* ovate, petiolate, slightly appressed, undersurface pale whitish green. *Leaves* ovate-lanceolate and lanceolate, petiolate, a little appressed, undersurface whitish, decussate, alternate at  $3\frac{1}{2}$  inches (9 cm.) (Benarkin, Q.).

*1st leaves* ovate, petiolate, undersurface pale, thin, decussate (Dungog).

*1st leaves* linear. *1st alternate leaves* narrow-lanceolate (Wyong).

*1st leaves* ovate (Woy Woy).

*1st leaves* ovate, undersurface green, petiolate, later broadly ovate, undersurface warm tint. *Leaves* with three main veins, branching early (Ulladulla).

*E. Boormani.*

*1st leaves* lanceolate, undersurface red. *1st alternate leaves* ovate-acuminate, undersurface pale green (Penrith).

*E. siderophloia.*

*1st leaves* linear or narrow-lanceolate (Morisset).

*1st leaves* small, ovate, petiolate, undersurface pale. *Leaves* later, large, from  $2\frac{1}{2}$  to 3 inches (6.5 to 8 cm.), irregular, ovate, sometimes oblique on the petiole, undersurface paler green, decussate, height  $4\frac{1}{4}$  inches (11 cm.) (Rookwood).

*1st leaves* linear. *1st alternate leaves* lanceolate, very fine venation, intramarginal vein very near edge (Stuart Town).

**Series 7.—Peach-tree-like, pale green.**

(i.e., pale green, and in shape and habit more or less reminiscent of peach-tree shoots.)

*E. Rummergi.**E. Rudderi.*

(The affinity of these two species is fairly close, but for the minutely glandular stem of *E. Rummergi*. There are, however, a few scattered hairs or setæ on *E. Rudderi*. The latter species has some affinity with *E. paniculata* (Series 6).)

*General Appearance*.—Cotyledons small to medium, 6 pairs of leaves opposite. Leaves moss-green, somewhat drooping, narrow-lanceolate, peach-leaf-like. Stems terete, slightly glandular, green, shaded pink.

(1) *Hypocotyl.*

<i>E. Rummergi</i>	} Long.
<i>E. Rudderi</i>	

(1a) *Hypocotyl* (Miss Flockton).

*E. Rummergi*, terete, fragile and pale green, slightly tinted with pink (No. 1); terete, red and slender (No. 2).

*E. Rudderi*, terete, light brown, very short (Gloucester).

(2) *Cotyledons* (Petiole and taper).

*E. Rummergi*, emarginate, short, tapering.

*E. Rudderi*, slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Rummergi*, green (Casino).

*E. Rudderi*, red tint (Gloucester).

(3) *Stem* (Miss Flockton).

*E. Rummeryi*, from cotyledons starts pinkish, but becomes green, angular and warty (1); angular, reddish and sparsely covered with glands. These glands become much thicker and more pronounced as the seedlings grow taller (2).

*E. Rudderi*, somewhat angular, green, with a soft purplish bloom and purple ribs (Gloucester); green, faint tint of pink (Bohnock).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Rummeryi*, petiolate, lanceolate; rachis minutely glandular.

*E. Rudderi*, petiolate, lanceolate; rachis minutely glandular, but not as dense as in *E. Rummeryi*.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Rummeryi*, six, narrow-lanceolate, slightly hispid on margins, veins obscure, dark or olive green. Stem slightly angular, minutely and densely glandular.

*E. Rudderi*, five (or more), narrow-lanceolate, slightly undulate, venation obscure, light olive green. Stem slightly angular, with a few scattered seta.

(6) *Intermediate Leaves*.

*E. Rummeryi*, lanceolate, finely veined, light to yellowish green, 8 by 3 cm., stem angular, glandular.

*E. Rudderi*, lanceolate, finely veined, light to yellowish green, 4 by 1½ cm. Stem slightly angular, but scarcely glandular.

## (6a) (Miss Flockton).

*E. Rummeryi*.

*1st leaves* narrow-spathulate.

*1st leaves* ovate-lanceolate (1).

*1st leaves* small ovate. *Leaves* ovate-lanceolate, with undersurface paler green (2).

*E. Rudderi*.

*1st leaves* linear and ovate-lanceolate. *Leaves* lanceolate, with branchlets springing from the axils. There is a purplish tint on the young growth, and on the undersurface of some of the leaves. This seedling branches at once from every axil of the leaves, making a bushy plant when only 4 inches (10 cm.) high or less (Gloucester).

*1st leaves* linear. *1st alternate leaves* ovate-lanceolate, undulate (Bohnock).

## Series 8.—Orbicular, petiolate, triplinerved.

(Venulose and glaucous.)

*E. polyanthemos.*

*E. Dawsoni.*

*E. Caleyi.*

*General Appearance.*—Cotyledons small to medium, 2–3 pairs of leaves opposite. Leaves sub-glaucous, thickish, elliptical to orbicular, emarginate, triplinerved, venulose, petiole short to medium. Stems pinkish, somewhat flexuose, terete, compressed at the nodes.

### (1) *Hypocotyl.*

*E. polyanthemos*, short to long.

*E. Dawsoni*, short.

*E. Caleyi*, short to long.

### (1a) *Hypocotyl* (Miss Flockton).

*E. polyanthemos*, red (Stuart Town); smooth, red (Grattai); terete, slight, tinted pink (Bathurst to Sofala); terete, red, slight (Rylstone); terete, red (Queanbeyan).

*E. Dawsoni*, terete, red (Gulgong).

*E. Caleyi*, red, smooth (Howell, No. 1); smooth, dark red (No. 2); crimson (No. 3).

### (2) *Cotyledons* (Petiole, taper).

*E. polyanthemos* and *E. Dawsoni*, small, emarginate, short taper.

*E. Caleyi*, medium, scarcely emarginate, short taper.

### (2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. polyanthemos*, red (Stuart Town); purple red (Grattai); faint tint of purple (Bathurst to Sofala); red, sometimes green (Rylstone); light purple red tint (Queanbeyan).

*E. Dawsoni*, with faint purple tint (Gulgong).

*E. Caleyi*, crimson-purple (Howell, No. 1); crimson (No. 2); deep red (No. 3).

### (3) *Stem* (Miss Flockton).

*E. polyanthemos*, tinted red (Stuart Town); shaded red, covered with oil glands (Grattai); terete, red (Bathurst to Sofala); terete, smooth shading from red to green (Rylstone).

*E. Dawsoni*, terete, smooth, red (Gulgong).

*E. Caleyi*, angular, tinted pink (Howell).



(4) *1st Pair of Leaves* (Petiole, shape, vestiture).*E. polyanthemos*, petiole long, ovate, glabrous.*E. Dawsoni*, petiolate, ovate to spathulate, glabrous.*E. Caleyi*, petiole long, ovate, glabrous.(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).*E. polyanthemos*, two to three, ovate, venulose, petiole long, glabrous.*E. Dawsoni*, two, ovate, petiole long, glabrous.*E. Caleyi*, three, ovate to orbicular-spathulate, venulose, trinerved, glabrous.(6) *Intermediate Leaves*.*E. polyanthemos*, orbicular, emarginate or entire, venulose, triplinerved, abruptly contracted in a long petiole; at  $15\frac{1}{2}$  inches (39 cm.),  $3\frac{1}{4}$  by 3 cm., and at  $22\frac{1}{2}$  inches, 6 by 7 cm., which is broader than long and somewhat deltoid, glaucous to light yellowish-green.*E. Dawsoni*, broadly ovate or orbicular ovate to orbicular, entire or emarginate, venulose, triplinerved; at 14 inches (36 cm.),  $4\frac{1}{2}$  by  $4\frac{1}{2}$  cm., and at 22 inches (56 cm.),  $5\frac{1}{2}$  by  $4\frac{1}{2}$  cm., glaucous to yellowish-green.*E. Caleyi*, broad-spathulate to orbicular, emarginate to entire, venulose, but the veins not quite as prominent as the preceding; at 6 inches, 4 by  $3\frac{1}{2}$  cm.; at 21 inches (53 cm.), 6 by  $5\frac{1}{2}$  cm., glaucous to yellowish-green.(6a) *Intermediate Leaves* (Miss Flockton).*E. polyanthemos*.*1st leaves* ovate, undersurface tinted pink. *1st alternate leaves* ovate-rhomboid (Stuart Town).*1st leaves* ovate to orbicular, undersurface green, petiolate, decurrent (Grattai).*1st leaves* ovate, later almost or quite orbicular, midrib pink (Bathurst to Sofala).*1st leaves* ovate, small, petiolate. *Leaves* ovate-orbicular, petiolate, undersurface rather paler green, decussate, branching almost at once (Rylstone).*E. Dawsoni*.*1st leaves* ovate, very small. *Leaves* alternate stage orbicular with three marked nerves, emarginate, seedlings frail (Gulgong).*E. Caleyi*.*1st leaves* ovate. *1st alternate leaves* spathulate, trinerved.

### Series 9.—Ovate to broadly-elliptical, venulose.

*E. Baueriana*.

*E. Behriana*.

*E. Bosistoana*.

*General Appearance*.—Cotyledons medium, 1–3 pairs of leaves opposite. Light green, sometimes shaded pink. Veins prominent. Stems green or pinkish, terete to slightly angular.

(1) *Hypocotyl*.

*E. Baueriana*, short to long.

*E. Behriana*, short.

*E. Bosistoana*, short to long.

(1a) *Hypocotyl* (Miss Flockton).

*E. Behriana*, short, stained red (Wyalong).

*E. Bosistoana*, terete, red (Hargraves).

(2) *Cotyledons* (Petiole, taper).

*E. Baueriana*, small to medium, emarginate, short, tapering.

*E. Behriana*, small, emarginate, short, tapering.

*E. Bosistoana*, medium, slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Behriana*, slight mauve tint (Wyalong, No. 1); tinted purple (No. 2).

*E. Bosistoana*, slight mauve tint (Hargraves).

(3) *Stem* (Miss Flockton).

*E. Baueriana*, red (Penrith).

*E. Behriana*, terete, glandular, shaded red (Wyalong, No. 1); red (No. 2).

*E. Bosistoana*, angled, red, smooth (Hargraves); red (Marulan).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Baueriana*, *E. Behriana*, and *E. Bosistoana*, petiolate, lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Baueriana*, two (or more), elliptical, venulose, glabrous, dark green.

*E. Behriana*, two, lanceolate, veins not very prominent (seedling only 2½ inches, or 6.5 cm.), glabrous, green to yellowish-green.

*E. Bosistoana*, two, elliptical to broad lanceolate, venulose, dark to yellowish-green.

(6) *Intermediate Leaves.*

*E. Baueriana*, broadly ovate, venulose, at 6 inches (15 cm.),  $3\frac{1}{2}$  by  $2\frac{3}{4}$  cm., dark green.

*E. Behriana*, broadly elliptical to broad ovate, venulose; at 13 inches (33 cm.),  $5\frac{1}{2}$  by 4 cm., light green.

*E. Bosistoana*, ovate to broad-lanceolate, venulose; at 6 inches (15 cm.),  $3\frac{1}{2}$  by  $2\frac{1}{2}$  cm., at 18 inches, 6 by 4 cm., light to yellowish green.

## (6a) (Miss Flockton).

*E. Baueriana.*

*1st leaves* ovate. *1st alternate leaves* ovate or ovate-acuminate (Penrith).

*E. Behriana.*

*1st leaves* ovate, undersurface pale green. *1st alternate leaves* ovate-acuminate (Wyalong).

*1st leaves* linear or small ovate. *1st alternate leaves* ovate (Wyalong).

*E. Bosistoana.*

*1st leaves* ovate, thin, petiolate, undersurface mauve tint, decussate. *Leaves* ovate-orbicular, venation red (winter colouring), undersurface pale green, petiolate, decurrent (Hargraves).

*1st leaves* ovate, undersurface purple shade. *1st alternate leaves* broad-ovate, undersurface glaucous (Marulan).

**Series 10.—Hypericum-like.***E. pruinosa.**E. melanophloia.*

*General Appearance.*—Cotyledons medium, 5–6 pairs of leaves opposite, probably more. Leaves sub-glaucous, changing to yellowish green, tinged with purple-brown, narrow-lanceolate to oblong, and in a later stage broadly ovate; veins conspicuous, white. Stems green to pink.

(1) *Hypocotyl.*

*E. pruinosa*, long.

*E. melanophloia*, short.

(1a) *Hypocotyl* (Miss Flockton).

*E. pruinosa*, smooth, pink, very short, terete (Northern Territory).

*E. melanophloia*, tapering into root, red (Narromine); green, with a little pink, smooth (Narrabri).

(2) *Cotyledons* (Petiole, taper).

*E. pruinosa* and *E. melanophloia*, slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. pruinosa*, green (Northern Territory).

*E. melanophloia*, green (Narromine).

(3) *Stem* (Miss Flockton).

*E. pruinosa*, angular, tinted pink (Northern Territory).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. pruinosa* and *E. melanophloia*, petiolate, linear-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. pruinosa*, six (or more), lanceolate to broad-ovate, then changing to oblong, emarginate, venulose, glaucous to light green. Stem slightly angular.

*E. melanophloia*, five (or more), lanceolate to broad-ovate, large, then small, ovate to elliptical, slightly veiny, glaucous to light green. At 27 inches (68 cm.), 7 by 5 cm., at 32 inches,  $2\frac{1}{2}$  by  $1\frac{1}{2}$  cm.

(6) *Intermediate Leaves*.

*E. pruinosa*, none.

*E. melanophloia*, lanceolate, undulate, venulose; at 11 inches (28 cm.), 5 by  $1\frac{1}{2}$  cm., glaucous, venulose.

(6a) *Intermediate Leaves* (Miss Flockton).

*E. pruinosa*.

*1st leaves* small ovate, getting larger, undersurface slightly paler green (Northern Territory).

*E. melanophloia*.

*1st leaves* linear, lanceolate or ovate, undersurface slightly paler. *Leaves* ovate-lanceolate, sinuous, still opposite at 11 inches (28 cm.) high (Narromine).

The following description of the seedlings of *E. pruinosa* is from the pen of Mr. R. H. Cambage (*Journ. Roy. Soc., N.S.W.*, XLIX, 423, 1915):—

*Hypocotyl* erect, terete, pale green, glabrous, up to 1.3 cm. long.

*Cotyledons* slightly emarginate or almost reniform, entire, 5 to 8 mm. by 3 to 4 mm., upperside green, underside paler, glabrous; petioles 3 to 4 mm. long.

*Seedling foliage* opposite, entire, glabrous, elliptical-lanceolate, tapering into a short petiole of not more than 1 to 2 mm. long: midrib prominent on underside, lateral veins few, and arranged at angles of about 50° to 60° with midrib, reticulate between, intramarginal vein obscure on margin or absent. On a seedling 6 inches high the second pair of leaves measured about 1 cm. each, while those of the sixth to the tenth pair measured from 2 to 2.5 cm. with a width of 6 to 7 mm., the internodes increasing in length from about 1 to 1.8 cm. In one specimen the first internode measured 2 cm.

The seedling leaves of this species are very similar to those of *E. melanophloia*, and are of interest seeing that they taper towards the base into a very short petiole, while the adult leaves are sessile and cordate.

**Series 11.—Small, oblong to lanceolate, usually obtuse.**

<i>E. angulosa.</i>	<i>E. corrugata.</i>
<i>E. Pimpiniana.</i>	<i>E. torquata.</i>
<i>E. incrassata.</i>	<i>E. conglobata.</i>
<i>E. striatocalyx.</i>	<i>E. melanoxydon.</i>
<i>E. Griffithsii.</i>	<i>E. dumosa.</i>

*General Appearance.*—Cotyledons small to medium, 1 to 5 pairs of leaves opposite. Plants at first slender, greenish or pink, leaves small oblong, petiolate. Next stage short-lanceolate, acute or obtuse, green, shaded pink. Veins not very prominent, except in *E. dumosa*. Stems terete, green or pink.

[This series is remarkable for the small number of opposite leaves after the first pair, and also for the shortness of the subsequent pairs of leaves, and still further in the shortness of the intermediate leaves. In three cases the material is imperfect.]

**(1) *Hypocotyl.***

- E. angulosa*, long to very long.
- E. Pimpiniana*, short to long.
- E. incrassata*, long.
- E. striatocalyx*, short to very long.
- E. Griffithsii*, *E. corrugata*, and *E. torquata*, long.
- E. conglobata*, short to long.
- E. melanoxydon*, long.
- E. dumosa*, short.

**(1a) *Hypocotyl* (Miss Flockton).**

*E. angulosa*, red (Stirling Range); tall, smooth, red (Hopetoun); terete, pink, slight (Karoonda, S.A.); terete, slightly ribbed, long (Swan Hill var.).

*E. Pimpiniana*, brownish-pink, smooth (Ooldea, No. 1); red (No. 2).

*E. incrassata*, terete, red (Hopetoun).

*E. striatocalyx*, terete, red (near Cue, No. 1); very long (1½ inches), slightly ribbed, red (No. 2).

*E. Griffithsii*, red (Kalgoorlie).

*E. corrugata*, terete, pale pink (Southern Cross).

*E. torquata*, red (W.A., No. 1); red, ragged near the base, tapering into the root (W.A., No. 2).

*E. conglobata*, pink (Port Lincoln); rather short, smooth and red (Kalgan Plains).

*E. dumosa*, terete, slight, tinted pink (Wyalong); terete, red (Cobar); terete, red, wiry (var. at Wagin); smooth, red (var. at Dongarra) *E. Dongarraensis* (See Part LXVIII, 2, 371).

*E. dealbata* aff., terete, red, wiry (Minore).

(2) *Cotyledons* (Petiole, taper).

*E. angulosa*, slightly emarginate, trinerved, short, tapering.

*E. Pimpiniana*, emarginate, trinerved, short, tapering.

*E. incrassata*, slightly emarginate, short, tapering.

*E. striatocalyx*, lobed, long, tapering.

*E. Griffithsii*, entire, long, tapering.

*E. corrugata* and *E. torquata*, emarginate, long, tapering.

*E. conglobata*, entire, short, tapering.

*E. melanoxylon*, entire, long, tapering.

*E. dumosa*, slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. angulosa*, undersurface and edge crimson (Stirling Range); with some purple (Hopetoun); pink tint (Karoonda, S.A.); red (Murray Bridge, S.A.); pink tinted (var. at Swan Hill, etc.).

*E. Pimpiniana*, red (Ooldea).

*E. incrassata*, pink tint (Hopetoun).

*E. striatocalyx*, slight tint of red (Cue, No. 1); green (Cue, No. 2).

*E. Griffithsii*, shaded red (Kalgoorlie).

*E. corrugata*, green (Southern Cross).

*E. torquata*, purple (W.A.).

*E. conglobata*, red (Kirton Pt.); purple tint (Kalgan Plains).

*E. dumosa*, tinted red (Wyalong, N.S.W., and var. at Wagin); purple (var. at Dongarra).

(3) *Stem* (Miss Flockton).

*E. angulosa*, young, covered with stellate hairs (Stirling Range); smooth and shiny (Hopetoun); crimson (Murray Bridge).

*E. Pimpiniana*, flattened, some glands, green, shaded crimson (Ooldea, No. 1); tinted red (No. 2).

*E. striatocalyx*, red (W.A.).

*E. corrugata*, terete (Southern Cross).

*E. torquata*, pink shade, tapering into the root (W.A., No. 1); smooth, tinted red (No. 2).

*E. conglobata*, smooth, green, tinted with pink (Kirton Pt.); terete, later getting angular, red, a few glands (Kalgan Plains.).

*E. dumosa*, terete, red (Wyalong); becoming angular at the top (Cobar); red and angular sparsely covered with glands (var. at Wagin); terete, red, a few glands (var. at Dongarra).

*E. decalbata* aff., terete, at first, getting angular with the alternate leaves (Minore).

## (4) 1st Pair of Leaves (Petiole, shape, vestiture).

*E. angulosa*, petiolate, oblong, glabrous.

*E. Pimpiniana* }

*E. incrassata* }

*E. striaticalyx* }

*E. Griffithsii* }

*E. corrugata* }

*E. torquata* }

*E. conglobata* }

*E. melanoxylon* }

*E. dumosa* }

Petiolate, lanceolate, glabrous.

## (5) Subsequent Pairs of Leaves (Number, shape, vestiture).

*E. angulosa*, one, short-lanceolate, obtuse, veins somewhat distinct, light green, midrib reddish, glabrous.

*E. Pimpiniana*, two, short-lanceolate, obtuse, venulose, slightly oblique, light green, glabrous.

*E. incrassata*, one (or more), short-lanceolate, light green, glabrous.

*E. striaticalyx*, one (or more), short-lanceolate, light green, glabrous.

*E. Griffithsii*, four, short-lanceolate, acute, veins more or less distinct, light to yellowish-green, glabrous.

*E. corrugata*, three, short-lanceolate, acute, veins obscure, light to yellowish-green, glabrous.

*E. torquata*, two, short-lanceolate, obtuse, veins obscure, dark green, shaded purple on the lower surface, glabrous.

*E. conglobata*, one (or more), short-lanceolate, veins obscure, glaucous to light green, glabrous.

*E. melanoxylon*, one, short-lanceolate, veins obscure, glaucous, glabrous.

*E. dumosa*, two, short-lanceolate, obtuse, veins obscure, dark to light green, glabrous.

## (6) Intermediate Leaves.

*E. angulosa*, short-lanceolate or lanceolate, to broad-lanceolate, all short on fairly long petioles, veins more or less distinct, light green, midrib reddish; stems green or reddish, 4 by 2 cm.

*E. Pimpiniana*, lanceolate, scarcely acute, veins prominent, petioles long, light green, midrib reddish. Stem reddish, 4 by 2 cm.

*E. incrassata*, not far enough advanced.

*E. striaticalyx* (31), narrow-lanceolate (sketch only).

*E. Griffithsii*, short-lanceolate, veins somewhat prominent, petiole short, light green,  $3\frac{1}{2}$  by  $1\frac{3}{4}$  cm.

*E. corrugata*, short-lanceolate, petiole normal, light green, 3 by  $1\frac{1}{2}$  cm.

*E. torquata*, lanceolate to long-lanceolate, firm to slightly undulate, venation obscure, dark to light yellowish-green, 4 by  $1\frac{1}{2}$  cm. to 7 by  $1\frac{1}{2}$  cm.

*E. conglobata*, broad-lanceolate, obtuse, venation obscure or nearly so, midrib reddish, glaucous to purple brown. At  $5\frac{1}{2}$  inches (14 cm.),  $3\frac{1}{2}$  by 2 cm.

*E. melanoxydon*, short-lanceolate, glaucous (? not far enough advanced). In the next stage it is like the last stage of *E. torquata* (the specimen is unsatisfactory). At 14 inches (36 cm.), lanceolate, tending to long-lanceolate, veins distinct, yellowish-green throughout, 6 by  $1\frac{1}{2}$  cm. to  $6\frac{1}{2}$  cm. by  $1\frac{1}{2}$  cm.

*E. dumosa*, lanceolate to elliptical lanceolate, apiculate, venulose, light to glaucous green; at 9 inches (23 cm.), (8A), 4 by  $1\frac{1}{2}$  cm., and at 11 inches (28 cm.), (18 H H), 6 by 3 cm.

(6a) (Miss Flockton).

*E. angulosa.*

*1st leaves* ovate, covered on both sides with stellate hairs, red edges and under-surface, glaucous. *1st alternate leaves* ovate, edges no longer red (Stirling Range).

*1st leaves* ovate, smooth, undersurface purple shade, no stellate or simple hairs on this plant. *1st alternate leaves* ovate, undersurface slightly paler green. No sign in the first stage of glands or hairs on the epicotyl or young leaves (Hopetoun).

*1st leaves* lanceolate or ovate-obtuse (Karoonda).

*1st leaves*, 1st pair lanceolate, blunt-tipped, tapering into a long petiole, 2nd pair ovate, shortly petiolate (Swan Hill).

*E. Pimpiniana.*

*1st leaves* lanceolate, ovate lanceolate. *1st alternate leaves* ovate-acute (Ooldea).

*E. incrassata.*

*1st leaves* ovate, petiolate (Hopetoun).

*E. striatocalyx.*

*1st leaves* lanceolate, obtuse. *1st alternate leaves* lanceolate (near Cue, W.A.).

*1st leaves* ovate decussate (near Cue).

*E. Griffithsii.*

*1st leaves* ovate, undersurface purple tint, long petiole. *1st alternate leaves* ovate (Kalgoorlie).

*E. corrugata.*

*1st leaves* lanceolate and ovate-lanceolate. *Leaves* ovate-lanceolate (Southern Cross).



*E. torquata.*

*1st leaves* ovate or lanceolate, undersurface with much purple. *1st alternate leaves* the same, larger (W.A.).

*1st leaves* ovate, with reddish purple on both surfaces. *1st alternate leaves* lanceolate, sinuous, red midrib and edges (W.A.).

*E. conglobata.*

*1st leaves* ovate, undersurface purple. *1st alternate leaves* ovate (Kirton Pt.).

*1st leaves* small, linear. *1st alternate leaves* ovate-lanceolate (Kirton Point).

*1st leaves* ovate, undersurface purple tint. *1st alternate leaves* broadly ovate, sometimes sinuous, midrib red, the leaves a dark blue-green in colour (Kalgan Plains).

*E. dumosa.*

*1st leaves* ovate, petiolate, undersurface slight mauve tint (Wyalong).

*1st leaves* small, ovate. *Leaves* ovate, petiolate, venation more or less red (Cobar).

*1st leaves* ovate, glands on back of midrib. *Leaves* ovate (var. at Wagin).

*1st leaves* linear or ovate. *1st alternate leaves* ovate, red midrib, purple underside to some of them (var. at Dongarra).

**Series 12.—Glaucous, quadrangular and somewhat rigid.***E. Clelandi.**E. Woodwardi.*

*General Appearance.*—Cotyledons small to medium, leaves opposite for at least five pairs, small, oblong to oblong-lanceolate, thickish, glaucous, shortly petiolate. As the plants develop, the glaucousness appears to be more pronounced. The stems also are quadrangular for a long period.

(1) *Hypocotyl.*

*E. Clelandi*, long.

*E. Woodwardi*, very long.

(1a) *Hypocotyl* (Miss Flockton).

*E. Clelandi*, tapering into the root, slightly angular, crimson (W.A.); terete, red (var. at Darke's Peak).

*E. Woodwardi*, long, feeble, tinted red (130 miles east of Kalgoorlie).

(2) *Cotyledons* (Petiole, taper).

*E. Clelandi*, entire, short, tapering.

*E. Woodwardi*, long, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Clelandi*, purple shade (W.A.).

*E. Woodwardi*, tinted red or green (130 miles east of Kalgoorlie).

(3) *Stem* (Miss Flockton).

*E. Clelandi*, angular and warty (W.A.).

*E. Woodwardi*, terete, red, a few glands; after the first pair of leaves getting suddenly thicker, very angular and glaucous green (130 miles east of Kalgoorlie).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Clelandi*, petiolate, lanceolate, glabrous.

*E. Woodwardi*, petiolate, lanceolate, slightly denticulate.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Clelandi*, two (or more), lanceolate, veins obscure, glaucous, glabrous, stem glandular.

*E. Woodwardi*, six, oblong-lanceolate, thick, glaucous, petioles distinct; stems quadrangular.

(6) *Intermediate Leaves*.

*E. Clelandi*, broad-lanceolate, venulose, glaucous, at 9 inches, 4 by 3 cm. Stem glaucous, angular.

*E. Woodwardi*, leaves broadly lanceolate, slightly apiculate, thickish, slightly undulate, the margin sometimes purple-brown, veins obscure, the midrib yellowish, 7 to 8 cm. long, 3 to 4 cm. broad, glaucous, shaded yellowish green; petiole medium, thick. Stem quadrangular, the angles fringed with purple-brown (130 miles east of Kalgoorlie).

(6a) (Miss Flockton).

*E. Clelandi*.

*1st leaves* ovate, undersurface purple shade. *1st alternate leaves* ovate-acuminate, undersurface a paler opaque green. The stem more angular in the second stage (W.A.).

*1st leaves* ovate, undersurface purple tint, decussate (var. at Darke's Peak).

*E. Woodwardi*.

*1st leaves* ovate, red at base, on the underside and edges. Short petiole at first. *1st alternate leaves* large ovate, somewhat glaucous, the same colour on both sides, broad pale midrib, red edges. There are prominent glands on the edges of the leaves in the first and second stages (130 miles east of Kalgoorlie).

**Series 13 —Short, petiolate, small, elliptical to oblong, dark green, glandular.**

*E. Johnstoni*.

*E. aggregata*.

*E. vernicosa*.

*E. ovata*.

*E. camphora*.

*E. Kitsoniana*.

[*E. Johnstoni* and *E. vernicosa* are closely allied; so are *E. ovata* and *E. Kitsoniana*.]

*General Appearance*.—Cotyledons small to medium, 3–4 pairs of leaves opposite. Leaves Prunus-like, small, oblong to ovate, elliptical, dark green above, slightly purplish underneath. Petioles short. Stems green, glandular hispid.

(1) *Hypocotyl*.

*E. Johnstoni*, long.

*E. vernicosa*, short or medium.

*E. aggregata*, long.

*E. ovata*, short to long.

*E. Kitsoniana*, short.

(1a) *Hypocotyl* (Miss Flockton).

*E. Johnstoni*, red (Tasmania).

*E. vernicosa*, crimson, terete (Tasmania, No. 1); short, terete, red (No. 2).

*E. aggregata*, terete, red (Wallerawang, No. 1); terete, short, red (No. 2); ribbed, red, epicotyl with prominent glands (Lake St. Clair, Tasmania).

*E. ovata*, smooth, tinted red (Huonville); red (Beltana); long, weak, thin, inclined to be angular, red (Wyndham); red (Marulan); short, terete, tinted pink (Berrima).

*E. Kitsoniana*, red, thickens where the root begins (Victoria); red, a few warty glands, slightly angular (Foster).

*E. camphora*, terete, red, spindly (Wingello); very short, red (Paddy's River).

(2) *Cotyledons* (Petiole, taper).

*E. Johnstoni*, emarginate, short, tapering.

*E. vernicosa*, small, scarcely emarginate, short, tapering.

*E. aggregata*, small, emarginate, short, tapering.

*E. ovata*, emarginate, short, tapering.

*E. Kitsoniana*, emarginate, oblong, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Johnstoni*, red (Tasmania).

*E. vernicosa*, deep red (Tasmania); deep crimson (Tasmania).

*E. aggregata*, green (Wallerawang); tinted red (Wallerawang); green (Lake St. Clair).

*E. ovata*, green (Huonville); sometimes purple tint (Wyndham); green (Marulan).

*E. Kitsoniana*, green (Victoria); pinkish mauve (Foster).

(3) *Stem* (Miss Flockton).

*E. Johnstoni*, slightly glandular (Tasmania).

*E. vernicosa*, angular and covered with prominent warty glands, shaded pink (Tasmania); angular, covered with prominent warty glands, tinted red (Tasmania).

*E. aggregata*, terete, glandular, pink (Wallerawang, No. 1); red, tapering to the root (No. 2); terete, red, with glands (Lake St. Clair).

*E. ovata*, red tinted, angular and with warted glands (Beltana); pale green, slightly angular, warty glands (Berrima); shaded red, with glands not prominent (Victoria).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Johnstoni*, petiolate, lanceolate, glabrous; rachis glandular.

*E. vernicosa*, petiolate, oblong-lanceolate, glabrous; rachis glandular.

*E. aggregata* and *E. ovata*, petiolate, lanceolate, glabrous.

*E. Kitsoniana*, petiolate, narrow-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Johnstoni*, three (or more), lanceolate, shortly petiolate, glabrous; stem glandular.

*E. vernicosa*, three (or more), nearly sessile, oblong-lanceolate to elliptical, dark to yellowish green, glabrous; stem glandular.

*E. aggregata*, four (or more), lanceolate, nearly sessile, glabrous, dark to yellowish green; stem minutely glandular.

*E. ovata*, four (or more), narrow lanceolate to ovate-lanceolate, nearly sessile, dark to yellowish green, glabrous; stem minutely glandular.

*E. Kitsoniana*, four (or more), narrow-lanceolate, then changing to ovate-lanceolate and sometimes cordate, sessile, dark green shaded yellowish-green, venation very fine, almost obscure, midrib reddish; stem terete, glabrous.

(6) *Intermediate Leaves*.

*E. Johnstoni*, not available.

*E. vernicosa*, small ovate, nearly sessile, yellowish-green. The largest 12 mm. by 10 mm. (? not fully developed).

*E. aggregata*, oblong, acute, sessile or nearly so, somewhat rigid, venation fairly prominent, glaucous to yellowish-green. At 10½ inches (27 cm.), 3 by 1½ cm.

*E. ovata*, elliptical-lanceolate, shortly petiolate (24), Tas., 4 by 2 cm. A plant 6 inches (15 cm.), (B. 40), Berrima, is shortly petiolate, oblong-lanceolate, 4 by 1½ cm., yellowish-green. An advanced seedling from Wyndham (C. 80) is long lanceolate, 9 by 2½ cm., midrib reddish, glaucous to yellowish-green.

*E. Kitsoniana*, broad-ovate to ovate-lanceolate and then lanceolate, shortly petiolate, yellowish-green, midrib and margins reddish. At 11 inches (28 cm.), 6 by 3½ cm. Stem terete.

(6a) (Miss Flockton).

*E. Johnstoni.*

*1st leaves* ovate, shortly pedicellate (Tasmania).

*E. vernicosa.*

*1st leaves* ovate, shortly petiolate, undersurface shaded purplish red. *1st alternate leaves* ovate, red colour in the axils of the leaves (Tasmania, No. 1).

*1st leaves* ovate and oblong, undersurface deep crimson (No. 2.)

*E. aggregata.*

*1st leaves* ovate, petiolate at base, more advanced, sessile or nearly so (Wallerawang, No. 1).

*1st leaves* small ovate. *1st alternate leaves* ovate-obtuse (Wallerawang, No. 2).

*1st leaves* small ovate-lanceolate (No. 3).

*1st leaves* small ovate, petiolate. *Leaves* ovate, sessile or almost so, undersurface slightly paler (Lake St. Clair).

*E. ovata.*

*1st leaves* ovate, red edges and midrib. *1st alternate leaves* larger, ovate (Beltana).

*1st leaves* small ovate-lanceolate, undersurface paler (Wyndham).

*E. Kitsoniana.*

*1st leaves* ovate-lanceolate, opposite (Victoria).

*E. camphora.*

*1st leaves* ovate, shortly petiolate, decussate, undersurface green. *Leaves*, plant 5¼ inches (14 cm.) high, leaves ovate, very shortly petiolate, slightly undulate, branching in the axils. Leaves still ovate and shortly petiolate, stiff, no longer undulate at 26 inches (66 cm.) high (Wingello).

*1st leaves*, 1st pair linear, then ovate, undersurface green, short petiole. *1st alternate leaves* obovate, undersurface pale green (Paddy's River).

Endorsed transit between *E. ovata* and *E. camphora*. A Mallee.

**Series 14.—Cordate (small).***E. oligantha.**E. Stuartiana.**E. Dunnii.**E. angophoroides.**E. Yarraensis* (see p. 281).

*General Appearance.*—Cotyledons medium; 4–5 pairs of leaves opposite. Leaves light green to glaucous, small, cordate to nearly stem-clasping, soon become alternate. Stems somewhat glandular, green to light purple brown.

In *E. oligantha* the first four pairs are opposite and narrow-lanceolate, and immediately above them the intermediate leaves start off, alternate, cordate.

In *E. Stuartiana* the first four pairs pass from narrow-lanceolate to ovate-lanceolate.

In *E. angophoroides* the first three pairs are narrow-lanceolate, and the next two, though still opposite, are cordate-lanceolate, similar to the alternate leaves.

In *E. Dunnii* only the first pair are narrow-lanceolate, while the next three pairs are cordate-lanceolate.

**(1) Hypocotyl.***E. oligantha*, short to long.

<i>E. Stuartiana</i>	} Long.
<i>E. angophoroides</i>	
<i>E. Dunnii</i>	

**(1a) Hypocotyl (Miss Flockton).***E. oligantha*, smooth, red (Kimberleys).*E. Stuartiana*, terete, red (Wallangarra and Mudgee).*E. angophoroides*, long, weak, thin, inclined to be angular, red (Wyndham).*E. Dunnii*, terete, light brown (Acacia Creek, No. 1); red (No. 2).**(2) Cotyledons (Petiole, taper).***E. oligantha*, lobed or very deeply emarginate, short, tapering.*E. Stuartiana*, lobed or very deeply emarginate, short, tapering.

*E. angophoroides*, lobed or very deeply emarginate, sometimes slightly emarginate, short, tapering.

*E. Dunnii*, emarginate, short, tapering.**(2a) Cotyledons (Undersurface, Miss Flockton).***E. oligantha*, red (Kimberleys).*E. Stuartiana*, purple (Wallangarra); pink (Mudgee); faint tint of pink (Tarana).*E. angophoroides*, purple (Wyndham).*E. Dunnii*, pink (Acacia Creek, No. 1); crimson (No. 2).

(3) *Stem* (Miss Flockton).

*E. oligantha*, glaucous white, tinted pink and getting more and more covered with prominent warty glands (Kimberleys).

*E. Stuartiana*, terete, rather prominent glands, pink or red shading up to pale opaque green (Mudgee); shaded red up to the cotyledons, slightly warty (Tarana).

*E. angophoroides*, terete, smooth, with prominent glands becoming more pronounced as the plant gets older, pink a little way up (Wyndham).

*E. Dunnii*, terete, glaucous, covered with rather prominent warty glands (Acacia Creek, No. 1); red shade (No. 2).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. oligantha*, petiolate, narrow-lanceolate, glabrous.

*E. Stuartiana*, petiolate, narrow-lanceolate; rachis glandular.

*E. angophoroides*, petiolate, narrow or linear-lanceolate, glabrous.

*E. Dunnii*, petiolate, narrow or linear-lanceolate; rachis slightly glandular.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. oligantha*, three, lanceolate, nearly sessile, glabrous, but glaucous.

*E. Stuartiana*, four, lanceolate to ovate-lanceolate, nearly sessile, glabrous, but glaucous.

*E. angophoroides*, five, narrow-lanceolate to nearly cordate-lanceolate, nearly sessile, glabrous, green, scarcely glaucous.

*E. Dunnii*, four, lanceolate to cordate-lanceolate, slightly undulate, very shortly petiolate, glabrous, light green to glaucous.

(6) *Intermediate Leaves*.

*E. oligantha*, broad-cordate, acute, slightly undulate or the margins crenulate, glaucous, the largest  $2\frac{1}{2}$  by  $2\frac{1}{2}$  cm., sessile; stem pink to glaucous.

*E. Stuartiana*, cordate, rather firm, mucronate, glaucous, but not quite so white as *E. oligantha*, sessile,  $2\frac{1}{2}$  by 2 cm.; stem glandular, green.

*E. angophoroides*, cordate, slightly undulate, sessile, veins somewhat prominent, light glaucous-green; at  $7\frac{1}{2}$  inches (19 cm.) 3 by 2 cm. (not far enough advanced).

*E. Dunnii*, cordate-lanceolate, undulate, shortly petiolate, veins somewhat prominent, glaucous, blotched with red; stem glaucous, shaded pink.

## (6a) (Miss Flockton).

*E. oligantha*.

*1st leaves* linear, glaucous, undersurface mauve tint. *1st alternate leaves* cordate, sessile, glaucous, green (Kimberleys).

*E. Stuartiana.*

*1st leaves* linear, pale glaucous green, undersurface purple. *Leaves* ovate-lanceolate, stem-clasping, undersurface pale (Wallangarra).

*1st leaves* linear or ovate, pale opaque green, with a faint purple tint on the undersurface of some of them. *Leaves* cordate, glaucous-green, undersurface paler. Plant 21½ inches (53 cm.) high (Mudgee).

*1st leaves* linear or narrow-lanceolate. *1st alternate leaves* ovate-lanceolate (Tarana).

*E. angophoroides.*

*1st leaves* linear, pedicel short, later ovate-cordate, sometimes ovate-lanceolate slightly crenulate edge, undersurface pale glaucous green (Wyndham.).

*E. Dunnii.*

*1st leaves* linear and ovate, undersurface pale glaucous green (Acacia Creek, No. 1).

*1st leaves* linear or narrow-lanceolate to ovate, undersurface purple shade (No. 2).

*E. Yarraensis.*

The following is from the pen of Mr. R. H. Cambage :—

*Hypocotyl* terete, red, about 6 mm. to 1 cm. long, .7 mm. thick at base, glabrous.

*Cotyledons* quadrilateral, slightly emarginate, 1-1.5 mm. long, 3-4 mm. broad, upperside green, underside at first red, becoming reddish-green to pale green.

*Stem.* red, terete.

*Seedling foliage* opposite for about the first six or seven pairs, entire, lanceolate to oval-lanceolate, glabrous, upperside green, underside very pale; petiole about 1-1.5 mm. First pair 6 mm. to 1 cm. long 2-3 mm. broad; second 1.3-1.7 cm. long, 3-6 mm. broad; third and fourth 1.1-2.2 cm. long, 3-9 mm. broad.

**Series 15.—Perfoliateae, glaucous.***E. Perriniana.*

- (1) *Hypocotyl*, medium.
- (2) *Cotyledons* (Petiole, taper), small, slightly emarginate, short, tapering.
- (3) *Stem*.
- (4) *1st Pair of Leaves* (Petiole, shape, vestiture), shortly petiolate, elliptical, glabrous.
- (5) *Subsequent Pairs of Leaves* (Number, shape, vestiture), four, elliptical to cordate, sessile, glaucous.
- (6) *Intermediate Leaves*, all perfoliate. Perfoliate, ovate-lanceolate or cordate lanceolate then orbicular-ovate, changing again to cordate lanceolate at both ends, glaucous throughout, the margins slightly crenulate edged with pale purple.

The above shapes represent the fusion of two similar leaves into a single perfoliate leaf.



**Series 16.—Sessile to stem-clasping, glaucous or pruinose.***E. pulverulenta.**E. nova-anglica.**E. urnigera.**E. Gunnii.**E. cordata.**E. rubida.**E. cinerea.**E. Dalrympleana.**E. elæophora.*

*General Appearance.*—Cotyledons small to medium. Opposite character indefinite. Leaves small, glaucous, more or less decussate, ranging from orbicular, cordate, to elliptical-lanceolate, all closely sessile or stem-clasping. Stems glaucous to purple-brown.

Reminiscent of certain species of *Podalyria* and *Hypericum*. This Series has some resemblance to the Reniformæ (small), Series 7.

**(1) *Hypocotyl.***

*E. cordata.* “Erect, quadrangular, glabrous, red, 3-4.2 cm. long.” (Lubbock.)

*E. pulverulenta* }  
*E. urnigera* } Long.

*E. cordata*, medium.

*E. cinerea*, medium to long.

*E. nova-anglica*

*E. Gunnii*

*E. rubida* } Long.

*E. Dalrympleana*

*E. elæophora*

**(1a) *Hypocotyl* (Miss Flockton).**

*E. pulverulenta*, smooth, red (Cox's River).

*E. urnigera*, red, slightly angular (Mount Wellington); red (Tasmania, No. 1); thick, red (No. 2).

*E. cordata*, red, smooth (Tasmania).

*E. cinerea*, crimson, runs evenly down into the root (Marulan); terete, weak, red (Wingello, No. 1); wiry, red (No. 2); red (No. 3); red, slightly warty (Tarana).

*E. nova-anglica*, red (New England); terete, red (Wallangarra); terete, slightly ribbed, thin, red (Berridale).

*E. rubida*, red, smooth, rather weak (Wingello); terete, red (Hargraves).

*E. Dalrympleana*, terete, red (Tinderry); terete, weak, red (Lake St. Clair); terete, red (Tasmania and Lake St. Clair).

*E. elæophora*, terete, red (Bendigo, Michelago and Bowan Park); pink tinted (Perth, N.S.W.); red, thickening slightly to the root (Grattai); terete, tinted red (Nundle).

(2) *Cotyledons* (Petiole, taper).

*E. cordata*. "Very similar to the last species (*E. rostrata*), shallowly emarginate, trinerved." (Lubbock.)

*E. pulverulenta*, emarginate, short, tapering.

*E. urnigera*, scarcely emarginate, short, tapering.

*E. cordata*, slightly emarginate, short, tapering.

*E. cinerea*, emarginate, short, tapering.

*E. nova-anglica*, slightly emarginate, short, tapering.

*E. Gunnii*, small, emarginate, short, tapering.

*E. rubida* and *E. Dalrympleana*, emarginate, short, tapering.

*E. elaeophora*, emarginate to lobed, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. pulverulenta*, red (Cox's River).

*E. urnigera*, deep crimson (Mount Wellington); pink (Tasmania).

*E. cordata*, purple red (Tasmania).

*E. cinerea*, glaucous (Marulan); purple (Wingello, No. 1); crimson (No. 2); pale green (No. 3); red (Tarana).

*E. nova-anglica*, red (Wallangarra).

*E. rubida*, green (Berridale); faint purple tint (Wingello); pale mauve (Hargraves).

*E. Dalrympleana*, red (Tinderry); red (Lake St. Clair, No. 1); deep crimson (No. 2).

*E. elaeophora*, red (Michelago, Bowan Park and Grattai); crimson (Nundle).

(3) *Stem* (Miss Flockton).

*E. cordata*. "Terete, covered with tubercular or fleshy protuberances, otherwise as in *E. rostrata*; 1st to 4th internodes 1.5-2.8 cm. long." (Lubbock.)

*E. pulverulenta*, glaucous purple, a few glands (Cox's River, No. 1); tinted pink (No. 2).

*E. urnigera*, angular and covered with prominent warty glands (Mount Wellington); thickly covered with warty glands; branching after the first pair of leaves (Tasmania).

*E. cordata*, pale green or pinkish white, with rather prominent glands (Tasmania).

*E. cinerea*, terete, pink, becoming white, with warty oil-glands (Marulan); terete, pink, with wart-like glands (Wingello, No. 1); angular, glaucous pink to green, glandular (No. 2); tinted with pink, covered with warty glands (No. 3); terete, glaucous pink, glandular (Tarana).

*E. nova-anglica*, glaucous green (New England); terete, pink to powdery white, glandular (Wallangarra).

*E. rubida*, glaucous pink, terete, a few glands (Wingello); terete, tinted pink (Hargraves).

*E. Dalrympleana*, glaucous, white, with glands (Tinderry); a little angular, pale yellow with prickly glands (Lake St. Clair); red with a few scattered glands (Tasmania).

*E. elaeophora*, terete, a few glands, pale opaque green and pink (Bendigo); terete, a few glands (Michelago); smooth (Perth, N.S.W.); terete, pink shading to green, weak, depressed glands (Bowen Park); terete, glaucous green and red, warty glands (Grattai); epicotyl terete, red changing to green (Nundle).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. cordata*. "First leaves as in *E. rostrata*, but sometimes entire, or slightly crenate, sessile, or in the case of the first pairs, sub-sessile and acute." (Lubbock.)

*E. pulverulenta*, shortly petiolate, obovate, glabrous.

*E. urnigera*, shortly petiolate, ovate, glabrous.

*E. cordata*, shortly petiolate, ovate, glabrous.

*E. cinerea*, sessile to distinctly petiolate, long-ovate, glabrous.

*E. nova-anglica*, petiolate, oblong or long-ovate; rachis glandular.

*E. Gunnii*, petiolate, ovate, glabrous; rachis minutely hairy.

*E. rubida*, petiolate, oblong, glabrous.

*E. Dalrympleana*, petiolate, ovate-lanceolate, glabrous.

*E. elaeophora*, petiolate, oblong, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. pulverulenta*, numerous, ovate, cordate to orbicular, mucronulate, with thin scarcely conspicuous branching veins, glabrous but glaucous.

*E. urnigera*, numerous, ovate cordate to orbicular, margins crenate, venation fine, branching, glabrous, glaucous to light green; stems glandular.

*E. cordata*, numerous, lanceolate, cordate-lanceolate to cordate, margins sometimes crenulate, veins fine, branching, glabrous, glaucous, the tips sometimes yellowish green.

*E. cinerea*, numerous, lanceolate, ovate to orbicular-emarginate, veins fine, branching, glaucous.

*E. nova-anglica*, numerous, ovate to orbicular, mucronate, veins fine, branching, glabrous, glaucous.

*E. Gunnii*, narrow-ovate to broad-ovate acute, then ovate, obtuse, veins very fine, branching, glaucous.

*E. rubida*, numerous, narrow-ovate, elliptical, orbicular, slightly crenulate to cordate, veins fine, branching, glaucous to yellowish green.

*E. Dalrympleana*, numerous, narrow-ovate, elliptical to cordate, emarginate or acute, veins fine, branching, glaucous to yellowish green.

*E. elaeophora*, numerous, narrow-oblong, ovate to broad-ovate emarginate, sometimes apiculate, veins distinct, white, fairly straight, glaucous to yellowish-glaucous or shading to light green.

(6) *Intermediate Leaves*.

In this Series the Intermediate Leaves are the same as the Subsequent Pairs. In other words, they are not in the alternate stage, and therein lies the difference between this group and group 13.

(6a) (Miss Flockton).

*E. pulverulenta*.

*1st leaves* ovate, glaucous. *Leaves* more advanced, orbicular, sessile, decussate (Cox's River).

*1st leaves* ovate, undersurface purple (Cox's River).

*E. urnigera*.

*1st leaves* ovate, undersurface purple. *Leaves* more advanced, nearly orbicular, stem-clasping, crenulate edge, large glands, undersurface green not glaucous (Mount Wellington).

*1st leaves* lanceolate or ovate (Tasmania).

*1st leaves* ovate, later orbicular to stem-clasping, glaucous (Tasmania).

*E. cordata*.

*1st leaves* ovate, with short petioles, becoming later sessile, ovate-lanceolate and orbicular, very glaucous (Tasmania).

*E. cinerea*.

*1st leaves* very small, elliptical, ovate, glaucous on both sides, sessile, afterwards becoming orbicular (Marulan).

*1st leaves* ovate, broad-ovate to orbicular, shortly petiolate, becoming glaucous. *Leaves* orbicular, nearly sessile (Wingello, No. 1).

*1st leaves* oblong, glaucous, sometimes ovate, slightly pointed. *Leaves* orbicular, sometimes with a slight point, stem-clasping, glaucous (No. 2).

*1st leaves* narrow-ovate, opposite, afterwards orbicular, glaucous (No. 3).

*1st leaves* ovate, pale glaucous green, undersurface whiter. *Leaves* more advanced, orbicular (Tasmania).

*E. nova-anglica*.

*1st leaves* elliptical, becoming ovate, sessile, later orbicular, with red midribs (New England).

*1st leaves* narrow-lanceolate, petiolate. *Leaves* ovate, slightly cordate, sessile, pale glaucous green, undersurface a little paler (Wallangarra).

*E. rubida.*

*1st leaves* lanceolate and lanceolate obtuse (Berridale).

*1st leaves* linear, petioles short, glaucous undersurface, faint tint of purple. *Leaves* later, sessile, orbicular to ovate, glaucous, midrib pink (Wingello).

*1st leaves* ovate-lanceolate, rather glaucous. *Leaves* orbicular or cordate, sessile venation and edges red, undersurface rather paler green and glaucous. The pairs of leaves almost parallel and above one another (Hargraves).

*E. Dalrympleana.*

*1st leaves* very small, ovate, glaucous, undersurface purple (Tinderry).

*1st leaves* usually ovate-cordate, sessile. *Leaves* broad, cordate, sessile, but not stem-clasping, undersurface pale green, decussate. There is a good deal of variation in the leaves of these seedlings, from ovate-lanceolate to ovate-orbicular, the latter cordate, the former not so (Lake St. Clair).

*1st leaves* small ovate, shortly petiolate, undersurface glaucous, with mauve tint. *Leaves* orbicular, cordate, stem-clasping, glaucous, midrib red, the same colour on both sides, opposite. Plants from 10 inches to 14 inches (25.5 to 36 cm.) high, leaves not decussate after the quite young stage (Lake St. Clair).

*1st leaves* oblanceolate to ovate. *1st alternate leaves* obovate (Tasmania).

*E. elaeophora.*

*1st leaves* petiolate, linear, lanceolate. *Leaves* ovate, almost sessile, under surface slightly paler, opaque whitish green, pink venation, decussate, undulate, edge slightly crenate (Bendigo).

*1st leaves* narrow-ovate, ovate, orbicular, undersurface green, red edges and midrib (Michelago).

*1st leaves* lanceolate. *1st alternate leaves* ovate or ovate-lanceolate (Perth, N.S.W.).

*1st leaves* linear, ovate, undersurface soft mauve tint (Bowen Park).

*1st leaves* narrow-ovate, ovate, sessile, undersurface pale whitish green. Height 10½ inches (27 cm.), leaves still opposite and sessile, undersurface pale (Grattai).

*1st leaves* linear, dull opaque green, undersurface dull purple (Nundle).

**Series 17.—Sessile, narrow-lanceolate to elliptical, spreading, stem-clasping.**

<i>E. viminalis</i> .	<i>E. Macarthuri</i> .
<i>E. Benthami</i> .	<i>E. unialata</i> .
<i>E. Risdoni</i> var. <i>elata</i> (cult. N.Z.).	

*General Appearance*.—Cotyledons medium or small to medium. Number of pairs indefinite. Leaves dark green to slightly glaucous, spreading or at right angles from the stem, narrow lanceolate to elliptical; stems glandular. The characters of these five species are fairly uniform.

(1) *Hypocotyl*.

<i>E. viminalis</i>	}	Long.
<i>E. Benthami</i>		
<i>E. Macarthuri</i>		
<i>E. unialata</i> , very long.		
<i>E. Risdoni</i> var. <i>elata</i> , medium.		

(1a) *Hypocotyl* (Miss Flockton).

<i>E. viminalis</i> , shaded red (Cooma); red (Marulan); terete, red (Grattai).
<i>E. Benthami</i> , long, delicate, red, thickening to the root (Cobbitty).
<i>E. Macarthuri</i> , red (Wingello); terete, red (Yarrimbah).
<i>E. unialata</i> , terete, smooth, red (Hobart).

(2) *Cotyledons* (Petiole, taper).

<i>E. viminalis</i> , small, emarginate, short, tapering.
<i>E. Benthami</i> , medium, deeply emarginate or the cotyledon nearly triangular long, tapering.
<i>E. Macarthuri</i> , small, slightly emarginate, short, tapering.
<i>E. unialata</i> , medium, emarginate, faintly trinerved, long, slightly tapering.
<i>E. Risdoni</i> var. <i>elata</i> , slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

<i>E. viminalis</i> , pink (Cooma and Marulan); red (Grattai).
<i>E. Benthami</i> , red (Cobbitty).
<i>E. Macarthuri</i> , red (Wingello); slightly tinted pink (Yarrimbah).
<i>E. unialata</i> , paler green (Hobart).

(3) *Stem* (Miss Flockton).

<i>E. viminalis</i> , smooth glandular (Marulan); terete, glandular, tinted pink (Grattai).
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*E. Benthami*, pink with a few glands (Cobbitty Bridge).

*E. Macarthuri*, smooth, sometimes tinted pink (Wingello).

*E. unialata*, terete, up to 5 inches, then getting angular, glands, but not very prominent (Hobart).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. viminalis*, petiolate, narrow-lanceolate, glabrous.

*E. Benthami*, shortly petiolate, narrow-oblong, glabrous.

*E. Macarthuri*, petiolate, narrow-lanceolate, glabrous.

*E. unialata*, petiolate, narrow-lanceolate or oblong-lanceolate, rachis glandular.

*E. Risdoni* var. *elata*, sessile, ovate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. viminalis*, numerous (still opposite at 33 inches), narrow-lanceolate, straight, sessile to slightly stem-clasping, veins faint, light to dark green; stem slightly glandular.

*E. Benthami*, numerous (at 44 inches still opposite), oblong to cordate, then narrow-lanceolate, sessile, veins faint, glaucous to pale green with a yellowish tinge.

*E. Macarthuri*, numerous (at 26 inches still opposite), narrow-lanceolate to elliptical, then shortly lanceolate, veins faint, light moss green; stem glandular.

*E. unialata*, numerous (at 31 inches still opposite), oblong lanceolate to ovate, acute, then lanceolate, veins fine, indistinct, glaucous shaded olive green with purple-brown midrib and margins; stem glandular.

*E. Risdoni* var. *elata*, numerous (at 42 inches still opposite), ovate to ovate-lanceolate, then lanceolate, veins faint, glaucous with a light greenish shade, when young (2 inches), shaded purple brown; stem glandular.

(6) *Intermediate Leaves*.

Not seen.

(6a) (Miss Flockton).

*E. viminalis*.

*1st leaves* lanceolate or ovate, undersurface tinted pink (Marulan).

*1st leaves* lanceolate, sessile, undersurface paler green. *Leaves* lanceolate, stem-clasping, decussate. Height  $9\frac{3}{4}$  inches (25 cm.) (Grattai).

*E. Benthami*.

*1st leaves* linear-obtuse, petiole short, with faint purple stain on the undersurface. After the two first pairs the leaves become oblong, then ovate decussate, glaucous and paler green on the undersurface (Cobbitty).

*E. Macarthuri*.

*1st leaves* elliptical or lanceolate, sessile, still opposite at 15 inches (Wingello).

*1st leaves* very young, lanceolate (Yarrimbah).

*E. unialata.*

*1st leaves* lanceolate, obtuse, undersurface whitish green, sessile, thin. *Leaves* later, opposite and stem-clasping, undersurface pale green (Hobart).

**Series 18.—Sessile, lanceolate, quadrangular, glaucous.***E. bicostata.**E. nitens.**E. Maideni.**E. quadrangulata.**E. goniocalyx.**E. neglecta.*

*General Appearance.*—Cotyledons medium to fairly large; numbers of pairs of leaves indefinite. Leaves glaucous, shaded yellowish green, short to long lanceolate, spreading, orbicular or broadly elliptical in *E. neglecta*; stems quadrangular.

The seedlings of *E. bicostata* and *E. Maideni* are often difficult to discriminate. At the State Nursery, Campbelltown, we find:—

*E. bicostata*, generally smaller leaves and the upper leaves and stem marked purplish cast.

*E. Maideni*, only trace of purplish.

(1) *Hypocotyl.**E. bicostata**E. Maideni**E. goniocalyx* Long.*E. nitens**E. quadrangulata*, short to medium.*E. neglecta*, long.(1a) *Hypocotyl* (Miss Flockton).*E. bicostata*, terete, a little ribbed, red (Upper Meroo).*E. Maideni*, red (Barber's Creek).

*E. goniocalyx*, short, smooth, tinted red (Mississippi Creek); terete, somewhat ribbed, red (Melbourne); tinted red, angular (Marulan).

*E. nitens*, terete, red (Aronmear).*E. quadrangulata*, shortish, terete, red (Hill Top); terete, red (Nundle).*E. neglecta*, terete, wiry, red.(2) *Cotyledons* (Petiole, taper).*E. bicostata*, deeply lobed, long, slightly tapering.*E. Maideni*, deeply lobed, long; tapering.



*E. goniocalyx*, slightly emarginate, long, tapering.

*E. nitens*, emarginate, short, tapering.

*E. quadrangulata*, emarginate, long, tapering.

*E. neglecta*, emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. bicostata*, purple red, variable in tint (Upper Meroo).

*E. Maidenii*, red (Barber's Creek).

*E. goniocalyx*, red (Mississippi Creek); purple shade (Marulan).

*E. quadrangulata*, purple tint (Hill Top); red (Nundle).

*E. neglecta*, green.

(3) *Stem* (Miss Flockton).

*E. bicostata*, young, angular, whitish green with pink shade (Upper Meroo).

*E. Maidenii*, angular, glaucous white, with warty glands (Barber's Creek).

*E. goniocalyx*, terete, smooth, pink a little way up (Mississippi Creek); young, slightly angular, glandular, pink to glaucous (Melbourne); angular with warty glands (Marulan).

*E. nitens*, angular (Aronmear).

*E. quadrangulata*, pale green, quadrangular, the edges winged, full of oil glands and pink in colour (Hill Top); terete, smooth, shaded pink, getting angular after the third pair of leaves (Nundle).

*E. neglecta*, red to pinky white, getting angular.

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. bicostata*, petiolate, narrow-lanceolate, glabrous.

*E. Maidenii*, petiolate, narrow-lanceolate, glabrous.

*E. goniocalyx*, petiolate, narrow-lanceolate, glabrous.

*E. nitens*, petiolate, oblong-lanceolate, glabrous.

*E. quadrangulata*, petiolate, oblong-lanceolate, glabrous.

*E. neglecta*, petiolate, ovate-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. bicostata*, numerous, narrow to broad-lanceolate, slightly undulate, sessile to stem-clasping, glaucous, shaded yellowish-green, with pinkish midrib and margins, veins distinct. Stems acutely quadrangular, glaucous, the angles often reddish.

*E. Maidenii*, numerous, narrow-lanceolate, shortly petiolate, changing to broad-lanceolate or ovate-lanceolate, stem-clasping, slightly undulate, glaucous with a purplish shading, veins distinct. Stems quadrangular, glaucous to purple-brown.

*E. goniocalyx*, numerous, narrow-lanceolate to broad-lanceolate, margins undulate, sessile to stem-clasping, venation distinct, glaucous to light glaucous green. Stems compressed-angular.

*E. nitens*, numerous, oblong to long-lanceolate, slightly undulate, sessile to stem-clasping, glaucous, shaded yellowish-green, veins somewhat distinct. Stems acutely angular, the angles sometimes reddish.

*E. quadrangulata*, numerous, narrow to long-lanceolate or almost acuminate-lanceolate, slightly undulate, sessile to stem-clasping, glaucous, shaded yellowish-green, the midrib and margins sometimes reddish. Stems acutely angular, the angles often reddish.

*E. neglecta*, numerous, ovate to broadly ovate, tending towards ovate-lanceolate, undulate, sessile to stem-clasping, glaucous, shaded yellowish-green, midrib reddish, veins distinct. Stem quadrangular, the angles reddish.

(6) *Intermediate Leaves.*

*E. bicostata*, oblong-lanceolate, the apex somewhat acuminate, undulate, stem-clasping, glaucous, veins more or less distinct. At 30 inches (76 cm.),  $11\frac{1}{2}$  by  $4\frac{1}{2}$  cm.

*E. Maideni*, ovate to oblong-lanceolate, apex short, undulate, stem-clasping, glaucous, veins more or less distinct. At 24 inches (64 cm.), 10 by 5 cm.

*E. goniocalyx*, lanceolate, undulate, stem-clasping, glaucous to light glaucous green. At 35 inches (89 cm.)  $10\frac{1}{2}$  by 4 cm.

*E. nitens* (the alternate stage not reached). At  $18\frac{1}{2}$  inches (47 cm.), 11 by 3 cm., long lanceolate, stem-clasping, glaucous, midrib reddish.

*E. quadrangulata*, same as in subsequent pairs.

*E. neglecta*, same as in subsequent pairs.

(6a) (Miss Flockton).

*E. bicostata*. (See Coloured Plate 1, Part LXXIII.)

*1st leaves* lanceolate, petiolate, undersurface pale whitish green, tinted pink. *Leaves* lanceolate, about the third pair sometimes parallel, sometimes decussate (Upper Meroo).

*E. Maideni.*

*1st leaves* linear or lanceolate, sessile or petioles very short. *1st alternate leaves*, none at 6 inches (15 cm.). The warty epicotyl and young leaves appear slightly glaucous. After the first pair of leaves they become sessile and cordate at the base. Undersurface white (Barber's Creek).

*E. goniocalyx.*

*1st leaves* linear and slightly glaucous, shortly petiolate, later obcordate (Mississippi Creek).

*1st leaves* linear to lanceolate, undersurface pale mauve tint, petiolate, later nearly sessile (Melbourne).

*1st leaves* linear to lanceolate, undersurface faint shade of purple and glaucous green. *Leaves* later, lanceolate sessile. At 24 inches it is still unchanged, the leaves sessile and decussate, but the plant is more branched (Marulan).

*E. quadrangulata.*

*1st leaves* linear, undersurface purple tint. *Leaves* still opposite at 13 inches (33 cm.), lanceolate, 4 inches long, sessile, the midrib and edges crimson, the undersurface slightly paler (Hill Top).

*1st leaves* small, lanceolate, sessile, the fourth pair stem-clasping, the undersurface a pale powdery green with some purple (Nundle).

*E. neglecta.*

*1st leaves* small, ovate, undersurface paler green, becoming glaucous.

### Series 19.—Short, broadish, Hypericum-like.

*E. maculosa.*

*E. Baeuerleni.*

*General Appearance.*—Cotyledons medium; leaves 6–7 pairs or more opposite, sub-glaucous to olive green, short, spreading, sessile to very shortly petiolate, oblong, long-ovate to lanceolate, the veins somewhat prominent; stems green to pink.

(1) *Hypocotyl.*

*E. maculosa*, long.

*E. Baeuerleni*, short to long.

(1a) *Hypocotyl* (Miss Flockton).

*E. maculosa*, terete, red (Cooma, Wingello and Mount Victoria); terete, red, spindly (Wingello); terete, thin, wiry, red (Capertee).

*E. Baeuerleni*, smooth, red (Monga).

(2) *Cotyledons* (Petiole, taper).

*E. maculosa*, emarginate, short, tapering.

*E. Baeuerleni*, slightly three-lobed, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. maculosa*, red (Cooma); slight purple tint (Capertee).

*E. Baeuerleni*, red (Monga).

(3) *Stem* (Miss Flockton).

*E. maculosa*, terete, red (Cooma); at first terete, becoming angled, a few glands (Wingello); terete, shaded pink, with a few rather prominent glands, becoming more marked as the plant gets older and the stem becomes more or less angular (Capertee).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. maculosa*, shortly petiolate, narrow-lanceolate, glabrous.

*E. Baeuerleni*, shortly petiolate, linear or narrow-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. maculosa*, six (or more), oblong-lanceolate, nearly sessile, veiny, glaucous to yellowish-green, glabrous.

*E. Baeuerleni*, three (or more), sessile, narrow-lanceolate, glaucous. (Not far enough advanced.)

(6) *Intermediate Leaves*.

*E. maculosa*, obtuse-lanceolate to lanceolate, slightly veined, dark glaucous to light yellowish-green, shortly petiolate. At 11 inches (28 cm.), 3 by 1 cm., at 24 inches, 6 by 1½ cm.

*E. Baeuerleni*, long-lanceolate, somewhat rigid, lightly veined, midrib reddish, glaucous to yellowish-glaucous. At 21 inches (53 cm.), 7 by 1½ cm.

## (6a) (Miss Flockton).

*E. maculosa*.

*1st leaves* linear to lanceolate, petiole, short, undersurface bright green, upper surface dull green (Cooma).

*1st leaves* linear to lanceolate, shortly petiolate to almost sessile, undersurface pale green, branches at an early stage (Wingello).

*1st leaves* very small, linear (Mount Victoria).

*1st leaves* linear-lanceolate, undersurface slightly paler. The venation is rather indistinct, the intramarginal vein is very near the edge (Capertee).

**Series 20.—Narrow, semi-rigid.**

*E. praecox*.

*E. parvifolia*.

*E. acaciaformis*.

*General Appearance*.—Cotyledons medium; at least six pairs of leaves opposite; slender, virgate, sub-glaucous, changing to a yellowish tint, narrow, almost linear-

oblong, nearly sessile. The last stage still narrow, but more rigid, and still shortly petiolate. Stems pink.

(1) *Hypocotyl*.

*E. præcox*, long.

*E. parvifolia*, short to long.

*E. acaciiformis*, short to long.

(1a) *Hypocotyl* (Miss Flockton).

*E. parvifolia*, terete, red (Kybean).

*E. acaciiformis*, terete, red (Walcha).

(2) *Cotyledons* (Petiole, taper).

*E. præcox*, emarginate, short taper. It is somewhat triangular.

*E. parvifolia*, not emarginate, somewhat orbicular, short, scarcely tapering.

*E. acaciiformis*, small, slightly emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. parvifolia*, red (Kybean).

*E. acaciiformis*, green (Walcha).

(3) *Stem* (Miss Flockton).

*E. parvifolia*, slightly angular, glands, red (Kybean).

*E. acaciiformis*, with warty glands (Walcha).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. præcox*, shortly petiolate, narrow or almost linear-lanceolate, glabrous.

*E. parvifolia*, sessile, linear-lanceolate, glabrous.

*E. acaciiformis*, shortly petiolate, linear-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. præcox*, five (or more), narrow-oblong, glaucous, nearly sessile, glabrous.

*E. parvifolia*, six (or more), linear to narrow-lanceolate, glaucous, sessile or nearly so, glabrous.

*E. acaciiformis*, ten (or more), linear to narrow-lanceolate, glaucous to dark green, shortly petiolate, glabrous.

(6) *Intermediate Leaves*.

*E. præcox*, narrow-lanceolate, slightly curved and somewhat rigid, glaucous shading to light yellowish-green, veins not prominent, petiole short; at 30 inches (76 cm.), 6 by 1 cm.

*E. parvifolia*, narrow-oblong, with a long needle-like point, somewhat rigid, glaucous-green, veins obscure; at 120 inches or 305 cm. (just alternate), 4 by  $\frac{1}{2}$  cm.

*E. acaciaformis*, narrow-oblong, obtuse, dark glaucous green shading to light yellowish-green, shortly petiolate,  $2\frac{1}{2}$  by  $\frac{1}{2}$  cm. The plant is very leafy at this stage, and the leaves are all short.

(6a) (Miss Flockton).

*E. parvifolia*.

1st leaves linear, stem-clasping (Kybean).

*E. acaciaformis*.

1st leaves linear (Walcha).

### Series 21.—Narrow-lanceolate.

*E. intertexta*.

*E. pallidifolia* (in first stage).

*E. rostrata*.

*E. Dwyeri*.

*General Appearance*.—Cotyledons medium; 4–6 pairs of leaves opposite, greenish, or slightly glaucous, sometimes tinged with red or purple-brown, oblong to long-lanceolate, venation moderately distinct.

(1) *Hypocotyl*.

*E. rostrata*. “Erect, terete, glabrous, red, 5–8 mm. long.” (Lubbock.)

*E. intertexta*, medium.

*E. rostrata*, medium.

*E. pallidifolia*, short.

*E. Dwyeri*, medium.

(1a) *Hypocotyl* (Miss Flockton).

*E. intertexta*, red (Coolabah, No. 1); red, slightly angular (No. 2).

*E. rostrata*, terete, pale green with slight tint of pink at base (Cargelligo); terete, red (Dunedoo).

*E. pallidifolia*, rather short, terete, red (Normanton).

(2) *Cotyledons* (Petiole, taper).

*E. rostrata*. “Small, transversely oblong, obtuse, entire, sometimes almost cordate at the base, glabrous, green, indistinctly one-nerved, with short and rather flat petioles.” (Lubbock.)

*E. intertexta*, very slightly emarginate, short tapering.

*E. rostrata*, slightly emarginate, short, tapering.

*E. pallidifolia*, not emarginate, short, tapering, aff. with *E. intertexta*.

*E. Dwyeri*, emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. intertexta*, green (Coolabah and Dunedoo); faint purple tint (Coolabah); pale green (Cargelligo).

*E. pallidifolia*, green or purple (Normanton).

(3) *Stem* (Miss Flockton).

*E. rostrata*. "Erect, square, herbaceous, ultimately woody, stained with red; 1st internode 2-4 mm.; 2nd, 3rd and 4th, 6-10 mm." (Lubbock.)

*E. intertexta*, smooth, slightly angular (Coolabah).

*E. rostrata*, angular from the alternate stage of the leaves (Cargelligo); red (Nyngan); red, smooth, terete, becoming angular with the alternate leaves (Dunedoo).

*E. pallidifolia*, smooth, slightly angular, tinted pink (Normanton).

(1) *1st Pair of Leaves* (Petiole, shape, vestiture).

"First leaves (*E. rostrata*) as in *E. globulus*, but oblong-lanceolate, obtuse, light green above, deep red beneath." (Lubbock.)

*E. intertexta*, *E. rostrata*, *E. pallidifolia*, and *E. Dwyeri*, all petiolate, narrow-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. intertexta*, six, narrow-lanceolate, slightly undulate, light green, veins somewhat prominent, glabrous; stem pinkish.

*E. rostrata*, three, lanceolate to narrow-lanceolate, sub-glaucous, shaded yellowish-green, veins distinct, glabrous; stem reddish.

*E. pallidifolia*, four, narrow-lanceolate, yellowish-green, glabrous; stem reddish. (Not far enough advanced.)

*E. Dwyeri*, four, narrow-lanceolate, slightly undulate, glaucous, shaded light green, veins distinct, glabrous; stem reddish.

(6) *Intermediate Leaves*.

*E. intertexta*, attenuate-lanceolate, slightly curved, veins somewhat prominent, light yellowish-green; stem flexuose, reddish.

*E. rostrata*, narrow-lanceolate, slightly undulate, glaucous to light green, midrib reddish, lateral veins obscure, stem slightly angular, reddish.

*E. pallidifolia*, short, inclined to broad-lanceolate, veiny, somewhat triplinerved, sub-glaucous, shaded yellowish-green, except upper leaves, which are a pale purple brown. Stem slightly flexuose, reddish.

*E. Dwyeri*, attenuate-lanceolate, curved and undulate, veiny, midrib sometimes reddish, olive green shaded light yellowish-green.

(6a) (Miss Flockton).

*E. intertexta.*

*1st leaves* linear and lanceolate. *1st alternate leaves* linear or narrow-lanceolate, 4 inches (10 cm.) long (Coolabah).

*E. rostrata.*

*1st leaves* ovate, underside pale opaque-green, petiolate, decussate, thin. *1st alternate leaves* lanceolate, petiolate, red midrib, undersurface pale green, decussate (Cargelligo).

*1st leaves* ovate or ovate-lanceolate. *1st alternate leaves* linear (Nyngan).

*1st leaves* small, ovate, petiolate. *Leaves* (at 6 inches or 15 cm. high) narrow-lanceolate, shortly petiolate, inclined to be appressed to the stem, red margin, midrib and venation (probably winter colouring) (Dunedoo).

*E. pallidifolia.*

*1st leaves* linear and lanceolate. *1st alternate leaves* ovate, thick, with a pale yellow green midrib, and semi-transparent edge, alike on both sides (Normanton).

## Series 22.—Narrow-oblong to attenuate (lanceolate falcate).

*E. scoparia.*

*E. Morrisii.*

*E. exserta.*

*E. Parramattensis.*

*E. Secana.*

*General Appearance.*—Cotyledons medium; 3–6 pairs of leaves opposite, dark to light green, shaded pink or light flame colour, ranging from narrow-linear to long and narrow-lanceolate, falcate; stems green or pink.

(1) *Hypocotyl.*

*E. scoparia*, long.

*E. exserta*, short.

*E. Morrisii*, short.

*E. Parramattensis*, medium.

*E. Secana*, short to medium.

(1a) *Hypocotyl* (Miss Flockton).

*E. scoparia*, terete, thin, red (Wallangarra).

*E. exserta*, crimson, does not thin into the root (Queensland).

*E. Morrisii*, smooth, pink (Coolabah).

*E. Parramattensis*, smooth, red, epicotyl inclined to be angular (Parramatta).

*E. Secana*, terete, red (Wallangarra and Brisbane).



(2) *Cotyledons* (Petiole, taper).*E. scoparia*, emarginate, long, tapering.*E. exserta*, slightly emarginate, short, tapering.*E. Morrisii*, slightly trilobed, emarginate, short, tapering.*E. Parramattensis*, sometimes small, slightly emarginate, short, tapering.*E. Seeana*, emarginate to cuneate emarginate, short, tapering.(2a) *Cotyledons* (Undersurface, Miss Flockton).*E. scoparia*, red (Wallangarra, No. 1); tinted pink (No. 2).*E. exserta*, green (Queensland).*E. Morrisii*, purple tint (Coolabah).*E. Parramattensis*, red (Parramatta).*E. Seeana*, green or with a slight pink tint; pale green (Grafton); green (Wallangarra).(3) *Stem* (Miss Flockton).*E. scoparia*, crimson (Wallangarra).*E. exserta*, slightly angular, crimson.*E. Morrisii*, wiry, red, smooth, with a few glands (Coolabah).*E. Parramattensis*, terete, smooth, red (Parramatta).*E. Seeana*, terete, pale green, a few scattered glands; slightly shaded pink (Grafton); terete, red (Wallangarra); red, angular, a few glands (Brisbane.)(4) *1st Pair of Leaves* (Petiole, shape, vestiture).*E. scoparia*, petiolate, almost linear-lanceolate, curved, glabrous.*E. exserta*, petiolate, narrow-lanceolate, glabrous.*E. Morrisii*, petiolate, lanceolate, glabrous.*E. Parramattensis*, petiolate, linear-lanceolate, glabrous.*R. Seeana*, petiolate, almost linear-oblong, glabrous.(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).*E. scoparia*, two, narrow-lanceolate, slightly curved, light green, glabrous.*E. exserta*, six, linear-lanceolate, light green with yellowish tinge, up to 10 cm. long, glabrous.*E. Morrisii*, three, narrow-lanceolate, light green shaded yellow, glabrous.*E. Parramattensis*, four, narrow-lanceolate to oblong, light green shaded pink, glabrous.

*E. Seeana*, four, narrow-lanceolate, green, glabrous. This has the same general colour as *E. Parramattensis*. It is, however, a smaller plant, but about the same age as *E. Parramattensis*.

(6) *Intermediate Leaves.*

*E. scoparia*, almost linear-lanceolate, somewhat rigid, straight or slightly curved, dark green; at 30 inches (76 cm.), 12 by  $\frac{1}{2}$  cm.

*E. exserta*, linear-lanceolate, very acute or the point attenuate, straight to flexuose, the margins undulate, dark green shading to yellowish-green, and then to madder-lake; at  $13\frac{1}{2}$  inches (34 cm.), 12 cm. by 4 mm., very flexuose.

*E. Morrisii*, oblong-lanceolate to almost linear-lanceolate, undulate, light green, shading to madder-lake.

*E. Parramattensis*, narrow-lanceolate, obtuse to lanceolate acute, veiny, light green shaded pink; at 7 inches (18 cm.), 6 by 1 cm. The last stage (height not given) a very dark green, 12 by  $\frac{3}{4}$  cm.

*E. Seeana*, narrow-lanceolate, slightly undulate, dark green. In the last stage lanceolate-falcate, light to dark green, 13 by 1 cm.

(6a) (Miss Flockton).

*E. scoparia.*

*1st leaves* linear (Wallangarra).

*1st leaves* linear. *1st alternate leaves* linear (Wallangarra).

*E. exserta.*

*1st leaves* lanceolate, undersurface green. *1st alternate leaves* linear, very long and narrow.

*E. Morrisii.*

*1st leaves* linear to narrow-ovate. *1st alternate leaves* linear (Coolabah).

*E. Parramattensis.*

*1st leaves* linear and lanceolate, red midrib. *1st alternate leaves* lanceolate, red midrib, undersurface pale green (Parramatta).

*1st leaves* linear. *1st alternate leaves* lanceolate, undersurface paler green (Canley Vale).

*E. Seeana.*

*1st leaves* linear. *1st alternate leaves* lanceolate and linear, variable in width, undersurface pale green, thin (Grafton).

*1st leaves* very small, linear or ovate, petiolate, venation red. *Leaves* ovate, petiolate, red midrib and edges, undersurface slightly paler (Wallangarra).

*1st leaves* linear, undersurface purple. *1st alternate leaves* ovate, undersurface purple-red (Brisbane).

**Series 23.—Semi-terete to quadrangular, petiolate, elliptical to orbicular.**

<i>E. dealbata.</i>	<i>E. cosmophylla.</i>
<i>E. tereticornis.</i>	<i>E. alba.</i>
<i>E. amplifolia.</i>	<i>E. Blakelyi.</i>
<i>E. Bancrofti.</i>	<i>E. Deanei.</i>
<i>E. pumila.</i>	

*General Appearance.*—Cotyledons small to medium; 3–6 pairs of leaves opposite, broad throughout, venulose, light green to slightly glaucous and also more or less tinged with red, oblong, broadly ovate-elliptical to broad-lanceolate with a tendency to orbicular in *cosmophylla*, *Bancrofti*, and *amplifolia*. Stems at first semi-terete, but angular in the first six species, ranging in colour from whitish to green shaded with purple-brown.

(1) *Hypocotyl.*

*E. dealbata*, *E. tereticornis*, and *E. amplifolia*, medium.

*E. Bancrofti*, short.

*E. cosmophylla*, medium.

*E. alba*, short to medium.

*E. Blakelyi*, medium.

*E. Deanei* and *E. pumila*, short.

(1a) *Hypocotyl* (Miss Flockton).

*E. dealbata*, terete, red, wiry (Bowning, No. 1); terete, red (Bowning, No. 2, also Grenfell and Wellington); terete, red, spindly (Mount McDonald); smooth, red, slightly angular (Narrabri, No. 1); pink, smooth, thickening very slightly to the root (No. 2); terete, red, weak and spindly (Bugaldi); tinted pink (Warialda).

*E. tereticornis*, terete, red (Outer Domain); red (Port Macquarie).

*E. amplifolia*, terete, red (Towrang).

*E. Bancrofti*, terete, red (Cooma and Wallangarra); terete, crimson (Stanthorpe).

*E. cosmophylla*, terete, wiry, red (S.A.); runs abruptly into the root, slightly angular, crimson (Kangaroo Island).

*E. alba*, crimson, thickening into the root (Java); green (*E. platyphylla*) (Queensland).

*E. Blakelyi*, smooth, terete, red (Stanthorpe); terete, crimson (Stanthorpe); terete, red (Stanthorpe).

*E. Deanei*, tapers into the root, crimson (Sandy Flat).

*E. pumila*, terete, red (Pokolbin).

(2) *Cotyledons* (Petiole, taper).

- E. dealbata*, small, emarginate, long, tapering.  
*E. tereticornis*, slightly emarginate, short, tapering.  
*E. amplifolia*, slightly emarginate, short, tapering.  
*E. Bancrofti*, emarginate, short, tapering.  
*E. cosmophylla*, deeply emarginate, short, tapering.  
*E. alba* and *E. Blakelyi*, emarginate, short, tapering.  
*E. Deanei*, emarginate, cuneate, short, tapering.  
*E. pumila*, emarginate, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

- E. dealbata*, green (Bowning, Grenfell, Bugaldi, and Warialda); pale green (Wellington); tinted purple (Narrabri, 2); faint purple shade (Narrabri, 28).  
*E. tereticornis*, green (Outer Domain and Port Macquarie).  
*E. Bancrofti*, green (Stanthorpe).  
*E. cosmophylla*, slight pink tint (S.A.); green (Kangaroo Island).  
*E. alba*, pale green (Java); green (*E. platyphylla*, Queensland).  
*E. Blakelyi*, red (Stanthorpe, B. 70); green (Stanthorpe, 34, 76 and 79).  
*E. Deanei*, pink (Sandy Flat).  
*E. pumila*, tinted red (Pokolbin).

(3) *Stem* (Miss Flockton).

*E. dealbata*, smooth, slightly angled (Bowning, Williams); angular, pink (Bowning, Boyd); angular, powdery, white and pink (Wellington); becoming angular with the alternate leaves, glaucous pink (Mount McDonald); slightly angular, tinted (Narrabri, 2); angular, tinted red (Bugaldi); pale green (Warialda).

*E. tereticornis*, angular, green, sometimes with a pink tint (Port Macquarie).

*E. amplifolia*, terete, afterwards angular, edged with red (Towrang, C. 98); terete, shaded pink (Towrang, C. 94).

*E. Bancrofti*, at first terete, becoming angular (Cooma); terete, shiny (Wallangarra); slightly angular, tinted red (Stanthorpe).

*E. cosmophylla*, smooth, red (Kangaroo Island).

*E. alba*, angular, warty glands, shaded crimson (Java).

*E. Blakelyi*, terete, smooth, tinted red (Stanthorpe, B. 70); crimson, slightly angular (Stanthorpe, 34).

*E. Deanei*, red, angular (Sandy Flat, Tenterfield).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. dealbata*, petiolate, narrow-lanceolate, glabrous.

*E. tereticornis*, petiolate, narrow-lanceolate, glabrous.

*E. amplifolia*, petiolate, narrow-lanceolate, glabrous.

*E. Bancrofti*, stem glandular, petiolate, narrow-lanceolate to nearly ovate-lanceolate, glabrous.

*E. cosmophylla*, petiolate, petiole long, ovate-lanceolate, glabrous.

*E. alba*, petiolate, narrow-lanceolate, glabrous.

*E. Blakelyi*, petiolate, petiole rather long, narrow-lanceolate, glabrous.

*E. Deanei*, petiolate, oblong-lanceolate, glabrous.

*E. pumila*, petiolate, narrow-lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. dealbata*, four, short-lanceolate, venulose, glaucous, midrib reddish also the stem, glabrous.

*E. tereticornis*, two, short-lanceolate to elliptical-lanceolate, venulose, slightly glaucous shading to yellowish-green, midrib sometimes reddish, also the stem, glabrous.

*E. amplifolia*, three (or more), lanceolate, veins scarcely distinct, light green, glabrous.

*E. Bancrofti*, two (or more), lanceolate to oblong-lanceolate, venulose, light green, midrib sometimes reddish, glabrous.

*E. cosmophylla*, two or three, lanceolate to elliptical-lanceolate, venulose, light green with a yellowish cast, midrib sometimes reddish, also the stem, glabrous.

*E. alba*, six, lanceolate to broad-lanceolate, veins somewhat distinct, light green, glabrous.

*E. Blakelyi*, four, lanceolate, obtuse to acute, venulose, dark green shading to yellowish-green, glabrous; stem reddish.

*E. Deanei*, four, narrow-lanceolate, light green, venation distinct, spreading.

*E. pumila*, two, obtuse-lanceolate, venulose, glaucous, midrib reddish, glabrous.

(6) *Intermediate Leaves.*

*E. dealbata*, broad-lanceolate to elliptical-lanceolate, firm, venulose, sometimes triplinerved, the midrib and the stronger lateral nerves somewhat reddish, glaucous, shaded yellowish-green. At 29 inches (74 cm.), 7 by 5 cm. Stem compressed angular to quadrangular.

*E. tereticornis*, elliptical-lanceolate to lanceolate, slightly undulate, veins prominent, sometimes triplinerved, dark green shaded yellowish-green, or the young tips purple-brown, midrib reddish to purple-brown. At  $5\frac{3}{4}$  inches (15 cm.), 6 by 2 cm.; at 9 inches (23 cm.), 5 by  $2\frac{1}{2}$  cm. and  $7\frac{1}{2}$  by  $2\frac{1}{2}$  cm. on the same twig. Stem slightly angular.

*E. amplifolia*, broad-lanceolate to lanceolate, slightly undulate, with rather few but distinct white veins, imperfectly triplinerved, light green, or glaucous shading to lighter green; stem slightly angular.

*E. Bancrofti*, oblong-lanceolate to lanceolate, then elliptical to broad-lanceolate, undulate, but at a later stage firm and thick, dark green mottled with yellowish-green, midrib sometimes reddish. At 18 inches (46 cm.), 9 by 3 cm.; at 27 inches (69 cm.), 10 by  $4\frac{1}{2}$  cm., and at a later stage (height not given), 5 by 3 cm. (84). Stem slightly quadrangular. In a specimen (B 86), the leaves are nearly orbicular; at 26 inches (66 cm.), 7 by  $6\frac{1}{2}$  cm., with the same colouring as 84.

*E. cosmophylla*, elliptical to nearly orbicular, apiculate, slightly undulate, veins prominent; midrib reddish, dark green, shaded glaucous and also with a light yellowish-green shade; at about 6 inches (15 cm.), 5 by 3 cm.; at 10 inches (25.5 cm.), 7 by  $5\frac{1}{2}$  cm., glaucous green. Another specimen at 22 inches (56 cm.), 9 by 8 cm., slightly undulate, dark yellowish-green; stem angular.

*E. alba*, ovate-lanceolate to lanceolate, undulate, strongly veined, midrib reddish, dark green shading to light green, tips deep rose; at 8 inches (20 cm.), 8 by 4 cm. to  $8\frac{1}{2}$  by 4 cm., stem compressed.

*E. Blakelyi*, broad-elliptical, undulate to broad-lanceolate, firm, venulose, midrib reddish, light green, 6 by 4 cm.; at  $13\frac{1}{2}$  inches (34 cm.), 8 by 4 cm. Stem sometimes flexuose, reddish.

*E. Deanei*, broad-lanceolate, undulate, with spreading reddish nerves, dark green shaded yellowish-green; at 7 inches (18 cm.), 6 by 3 cm.; stem quadrangular or slightly so, reddish.

*E. pumila*, ovate to broad-lanceolate, to almost oblong-lanceolate, apiculate, veins scarcely prominent, glaucous to yellowish-green; at 9 inches (23 cm.), 4 by  $3\frac{1}{2}$  cm.; at 16 inches (41 cm.), 5 by  $3\frac{1}{2}$  cm.; at  $18\frac{1}{2}$  inches (47 cm.), 6 by 3 cm. to 8 by 3 cm. on the same twig. Stems slightly flexuose, reddish.

(6a) (Miss Flockton).

#### *E. dealbata.*

*1st leaves* ovate-lanceolate, ovate, undersurface pale opaque green. *Leaves*, plant  $9\frac{1}{2}$  inches (24 cm.) high, ovate, venation marked, undersurface pale green, petiolate, red edges and first part of midrib (Bowning, Williams).

*1st leaves* ovate, petiolate, undersurface pale green. *Leaves* broadly ovate, venation red, undersurface pale green (Bowning, Boyd).

*1st leaves* ovate, petiolate, generally alternate after the second pair. Hardly paler on the undersurface (Wellington).

*1st leaves* ovate, petiolate, small. *Leaves* later, ovate-elliptical, midrib red, sometimes the edges also, petiolate, undersurface pale green (Mount McDonald).

*1st leaves* ovate-lanceolate. *1st alternate leaves* ovate, slightly undulate, undersurface red (Narrabri).

*1st leaves* lanceolate, central nerve and edges red, petiolate, undersurface tinted red. *Leaves* ovate, petiolate, venation and the young leaves tinted purple, also on the undersurface (Bugaldi).

*1st leaves* lanceolate, some ovate. *1st alternate leaves* lanceolate (Warialda).

*E. tereticornis.*

*1st leaves* very tiny lanceolate. later. ovate, undersurface pale green, red edges and petiole (Outer Domain).

*1st leaves*, first pair linear, afterwards ovate. *1st alternate leaves* ovate orbicular, undersurface pale glaucous green (Port Macquarie).

*E. amplifolia.*

*1st leaves* ovate. *Leaves* more advanced, large, flat, glaucous green (Towrang, 98).

*1st leaves* ovate, undersurface scarcely paler (Towrang, 94).

*E. Bancrofti.*

*1st leaves* ovate. *Leaves* ovate to orbicular, petiolate, venation distinct, undersurface pale green, decussate, alternate after the second pair, somewhat undulate (Cooma).

*1st leaves* ovate-lanceolate. *Leaves* lanceolate to ovate-lanceolate, alternate after the second pair, undersurface slightly paler, petiolate, undulate, distinct venation (Wallangarra).

*1st leaves* lanceolate, elliptical, irregular in shape. *1st alternate leaves* ovate, red colour at the back (Stanthorpe).

*E. cosmophylla.*

*1st leaves* small, ovate, petiolate, decurrent (S.A.).

*1st leaves* ovate-lanceolate (Kangaroo Island).

*E. alba.*

*1st leaves* lanceolate. *1st alternate leaves* ovate (Java).

*1st leaves* ovate, slightly sinuous. *1st alternate leaves* ovate, sinuous (*E. platyphylla*, Queensland).

*E. Blakelyi.*

*1st leaves* ovate. *1st alternate leaves* large, ovate, undulate, red edges and midrib, the same colour on both sides (Stanthorpe, 70).

*1st leaves* ovate. *1st alternate leaves* ovate, midrib red, undersurface pale glaucous green (Stanthorpe, 34).

*Leaves* lanceolate, petiolate, inclined to be trinerved, red midrib, edges and main nerves (Stanthorpe, 76).

*1st leaves* ovate, petiolate, undersurface pale green. *Leaves* later, decussate, ovate, slightly undulate, petiolate, undersurface green, red edges and venation (Stanthorpe, 79).

*E. Deanei.*

*1st leaves* linear, undersurface tinted red (Tenterfield).

## Series 24.—Stems quadrangular.

*E. rudis.*

*E. diversicolor.*

*E. Guilfoylei.*

*General Appearance.*—Stems quadrangular, usually edged with reddish or bright purple-brown lines. Young plants slender, the opposite character of the leaves well marked for at least six to twelve pairs. Leaves smallish, spathulate to lanceolate, all distinctly petiolate. As the plants approach the intermediate leaved stage the leaves become broad and markedly undulate, with scarcely prominent veins, and they retain a light green colour throughout.

The plants bear a very striking resemblance to Group 23, the *E. dealbata-tereticornis* group, but the opposite character appears to be carried a little further, and the venation is also much finer, especially in *E. Guilfoylei*, which appears to have some connection with Series 26.

### (1) *Hypocotyl.*

*E. rudis*, short to medium.

*E. diversicolor*, long.

*E. Guilfoylei*, very long.

### (1a) *Hypocotyl* (Miss Flockton).

*E. rudis*, short, smooth, red (Waroonna); terete, red (Woorooloo).

*E. diversicolor*, long, terete, but inclined to be angular, and more so in the epicotyl (W.A.); red (Denmark, W.A.).

*E. Guilfoylei*, terete, red, spindly, thickening a little at the base (A Murphy, 120); red, thickening at the base (Denmark); long crimson, the stem shading paler upwards, thickens towards the root (S. W. Jackson).

### (2) *Cotyledons.*

*E. rudis*, emarginate, short, sometimes long, tapering.

*E. diversicolor*, large, slightly emarginate to unequally lobed, very long, tapering.

*E. Guilfoylei*, emarginate, long, slightly tapering, trinerved.



(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. rudis*, red or pink (Waroona); very slight purple tint (Woorooloo); pale green (W.A., 217).

*E. diversicolor*, red (W.A., Z.); pale mauve tint (A. Murphy).

*E. Guilfoylei*, faint tint of purple at back (S. W. Jackson); purple red (A. Murphy, 120).

(3) *Stem* (Miss Flockton).

*E. rudis*, smooth, glands, angular, red (Waroona); terete, spindly, tinted pink (Woorooloo); red (W.A., 217).

*E. diversicolor*, above the cotyledons, pale green, angular (W.A., Z.); tinted pink (Denmark, W.A.).

*E. Guilfoylei*, epicotyl smooth and angular, edged with red (S. W. Jackson); pale green, edged with red, angular (Denmark).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. rudis*, petiolate, ovate to lanceolate, glabrous.

*E. diversicolor*, petiolate, narrow-lanceolate, glabrous.

*E. Guilfoylei*, petiolate, oblanceolate to spatulate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. rudis*, four or more, lanceolate, somewhat undulate, veins not prominent, dark green, glabrous.

*E. diversicolor*, seven, lanceolate, venulose, light green, glabrous, stem slightly quadrangular.

*E. Guilfoylei*, numerous, lanceolate to broadly lanceolate, undulate, glabrous, petioles distinct.

(6) *Intermediate Leaves*.

*E. rudis*, ovate-lanceolate to orbicular, then at a later stage broadly lanceolate, venulose, subtriplinerved, yellowish-green, the veins sometimes reddish. At 6 inches (15 cm.),  $3\frac{1}{2}$  by  $2\frac{1}{2}$  cm., at 16 inches (41 cm.), 5 by  $4\frac{1}{2}$  cm., and at 19 inches (48 cm.), 6 by 5 cm. Stem reddish.

*E. diversicolor*, elliptical to oblong-lanceolate, very undulate, with rather prominent nerves, dark green, shaded to light yellowish-green. At 24 inches (61 cm.), 6 by  $3\frac{1}{2}$  cm., petioles reddish, stem quadrangular; yellowish-green with reddish markings.

*E. Guilfoylei*, leaves ovate-lanceolate, sometimes strongly undulate, veins faint, parallel, rather distant. At  $21\frac{1}{2}$  inches (54 cm.) high, 9 cm. long, 4 cm. broad, and at 27 inches (69 cm.), 10 cm. long, 5 cm. broad, light yellowish-green, sometimes tinged with very pale purple-brown, petiole medium, purple-brown. Stem quadrangular, the angles edged with purple-brown, the remainder of the stem green (S. W. Jackson). The venation is somewhat similar to that of the *Corymbosæ*, and to the Group 26.

*E. rudis.*

(6a) (Miss Flockton).

*1st leaves* ovate, midrib red. *1st alternate leaves* ovate, undersurface pale opaque green, venation red (Warooka).

*1st leaves* small lanceolate or ovate, late ovate-undulate, undersurface pale green with a purple tint. *Leaves* large, orbicular, petiolate, undersurface pale (Woorooloo).

*E. diversicolor.*

*1st leaves* ovate, undersurface glaucous. *1st alternate leaves* the same, larger (W.A., Z.).

*1st leaves* ovate, petiolate, undersurface paler green (W.A., 115).

*1st leaves* ovate, undersurface glaucous. *1st alternate leaves* broad-lanceolate, sinuous (Denmark, W.A.).

*E. Guilfoylei.*

*1st leaves* spatulate or ellipsoid. *1st alternate leaves* ovate, undersurface pale green, red edge (S. W. Jackson).

*1st leaves* spatulate (A. Murphy, 120).

*1st leaves* spatulate or ellipsoid. *Leaves* ovate, undulate, undersurface pale green (Denmark).

Plant 13 inches (33 cm.) high, leaves large,  $4\frac{1}{2}$  inches (11.5 cm.), with petiole, ovate lanceolate, undulate, undersurface pale green, still opposite; stem very angular (Denmark).

**Series 25.—Longifolia.***E. canaliculata.**E. longifolia.**E. Kirtoniana.**E. longifolia* var. *multiflora*.

*General Appearance.*—Cotyledons fairly large; 4–5 pairs of leaves opposite, light green tinged with red, long lanceolate, venation distinct and spreading, stems terete to slightly angular.

(1) *Hypocotyl.**E. canaliculata**E. Kirtoniana**E. longifolia* var. *multiflora*

} Long.

(1a) *Hypocotyl* (Miss Flockton).*E. canaliculata*, red and slightly ridged (Dungog).

*E. Kirtoniana*, terete, shaded pink (Fraser Island, also Stradbroke Island); terete, weak, red (Bulladclah).

*E. longifolia*, red, smooth (Gosford); terete, red (Woy Woy); terete, but becoming ribbed or angular where the cotyledons come, red at the base, shading off pink (Rookwood); short, smooth, red (Nowra).

var. *multiflora*, terete, red (Kincumber).

(2) *Cotyledons* (Petiole, taper).*E. canaliculata**E. Kirtoniana* } Emarginate, long, tapering.*E. longifolia* var. *multiflora* }(2a) *Cotyledons* (Undersurface, Miss Flockton).*E. canaliculata*, red (Dungog).*E. Kirtoniana*, green (Fraser Island, Stradbroke Island, and Bulladelah).*E. longifolia*, red (Gosford, A. 16, and Nowra); pale green (Gosford 05); green (Woy Woy); green, with sometimes a slight tint of purple (Rookwood).var. *multiflora*, green (Kincumber).(3) *Stem* (Miss Flockton).*E. Kirtoniana*, slightly angular in the alternate stage of the leaves (Stradbroke Island); angular, small glands, tinted pink (Bullahdelah).*E. longifolia*, smooth, angular, tinted pink about 4 inches up (Gosford, A 16); crimson (Gosford 05).var. *multiflora*, terete, red (Kincumber).(4) *1st Pair of Leaves* (Petiole, shape, vestiture).*E. canaliculata*, petiolate, lanceolate, glabrous.*E. Kirtoniana*, petiolate, petiole long, lanceolate, glabrous.*E. longifolia*, petiole long, oblong, glabrous. In another specimen the first pair are lanceolate.var. *multiflora*, petiole long, ovate, acute, glabrous. Broader than the typical form.(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).*E. canaliculata*, four, lanceolate, veins spreading, dark green shaded with light yellow, glabrous.*E. Kirtoniana*, three, lanceolate, undulate, veins spreading, dark to light green glabrous.*E. longifolia*, three, lanceolate obtuse, slightly undulate, veins spreading, dark to light yellowish-green.var. *multiflora*, two (or more), lanceolate, light green, glabrous. (Not far enough advanced).(6) *Intermediate Leaves*.*E. canaliculata*, lanceolate, slightly undulate, inclined to be triplinerved towards the base, dark green. At  $5\frac{1}{2}$  inches (14 cm.), 9 by 2 cm., at  $18\frac{1}{2}$  inches (47 cm.), still lanceolate, 9 by 3 cm., at 25 inches high (64 cm.), 5 cm. long, 1.5 cm. broad.

*E. Kirtoniana*, lanceolate, undulate, veins somewhat distinct, spreading, dark green shaded light yellowish-green. At 17 inches (43 cm.) 12 by 2 cm., at 27 inches (69 cm.) slightly more acuminate, 6 by 2½ cm.

*E. longifolia*, lanceolate, somewhat firm, veins distinct, spreading, light green with still lighter green veins. At 9 inches (23 cm.) 6 by 1½ cm., at 15½ inches (39.5 cm.) broad lanceolate, 9 by 4 cm., and at 21 inches (53 cm.) lanceolate, 9 by 2½ cm. (at 26½ inches or 67 cm., broad-lanceolate, 13 by 4 cm., No. 009A), and at 19 inches (48 cm.) lanceolate falcate, 14 by 3 cm.

var. *multiflora*, narrow to broad-lanceolate, inclined to be short, as it gets broader, undulate, veins distinct, spreading, dark green shading to light green. At 5½ inches (14 cm.), 7 by 3 cm., at 14 inches (36 cm.), 9 by 4 cm., somewhat similar to No. 009A, *E. longifolia*, with spreading venation.

(6a) (Miss Flockton).

*E. Kirtoniana*.

*1st leaves* lanceolate, petiolate, decussate (Fraser Island).

*1st leaves* lanceolate, petiolate, decussate. *Leaves* lanceolate, petiolate, alternate, some broadish (Stradbroke Island).

*1st leaves* ovate, petiolate, undersurface pale whitish green, opposite decurrent.

*E. longifolia*.

*1st leaves* linear, undersurface pale green. *1st alternate leaves* lanceolate, a little sinuous, undersurface pale glaucous green (Gosford, A. 16).

*1st leaves* linear. *1st alternate leaves* linear-lanceolate (Gosford 05).

*1st leaves* slightly spathulate, lanceolate (Woy Woy).

*1st leaves* lanceolate, undersurface pale green, pedunculate, decussate (Rookwood).

*1st leaves* linear (Nowra).

var. *multiflora*.

*1st leaves* broad lanceolate (Kincumber).

## Series 26.—Fine parallel venation.

*E. Shiressii*.

*E. punctata* var.

*E. punctata*.

*E. resinifera*.

*E. propinqua*.

*E. notabilis*.

*E. adjuncta*.

*E. pellita*.

*E. botryoides*.

*E. saligna*.

*E. robusta*.

*E. grandis*.

*General Appearance*.—Cotyledons small to large; 4–6 pairs of leaves opposite, light green shading into madder-lake and purple-brown, narrow-lanceolate, finely veined, stems terete to angular, green to purple-brown.

(1) *Hypocotyl*.

*E. Shiressii*, *E. punctata*, *E. propinqua*, and *E. adjuncta*, long.

*E. botryoides* and *E. robusta*, medium to long.

*E. punctata* var., *E. resinifera*, *E. notabilis*, *E. pellita*, *E. saligna* and *E. grandis*, long.

(1a) *Hypocotyl* (Miss Flockton).

*E. Shiressii*, terete, red (Galston).

*E. punctata*, red (Acacia Creek, Queensland border, also Oatley, Sydney); terete, wiry, red (Gosford); terete, red (Tumble-down Dick, Sydney, Nowra); sturdy, terete, red (Manly); thickening slightly to the root, red (Como).

*E. propinqua*, crimson (Rolland's Plains); terete, slight, shaded pink (Craven State Forest); terete, red, thin (Port Stephens).

*E. adjuncta*, rather short, slightly angular, red, sturdy (Wyee), red (Morrisett).

*E. botryoides*, smooth, red, slightly angular at the top (La Perouse).

*E. resinifera*, smooth, pink, thickens slightly to the root (Como).

*E. notabilis*, terete, pink, thicker towards base (Glenbrook); terete, wiry, red (Glenbrook).

*E. pellita*, terete, weak, red (Gosford); terete, red (Wyang).

*E. saligna*, terete, red (Gosford); red, slightly angular at the top (Gosford A. 33).

*E. grandis*, terete, tall, red (Bulladelah).

(2) *Cotyledons* (Petiole, taper).

*E. Shiressii*, *E. punctata*, *E. propinqua*, and *E. adjuncta*, deeply emarginate, slightly triangular, long, tapering.

*E. botryoides*, emarginate, broadly triangular, short, tapering.

*E. robusta* and *E. punctata* var., emarginate, triangular, short, tapering.

*E. resinifera* and *E. notabilis*, emarginate, long, tapering.

*E. pellita*, deeply emarginate, broad cuneate to triangular, long, tapering.

*E. saligna*, deeply emarginate, triangular, long, tapering.

*E. grandis*, emarginate, oblong-triangular, short, tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Shiressii*, red (Galston).

*E. punctata*, green or purple (Acacia Creek); red (Gosford, Oatley, Nowra); purplish (Tumble-down Dick); purplish red (Manly); tinted red (Como).

*E. propinqua*, pale green (Rolland's Plains); green (Craven State Forest, also Port Stephens).

- E. adjuncta*, deep red (Wyee); red (Morrisett).  
*E. botryoides*, green (Kincumber); pink (La Perouse).  
*E. robusta*, green (La Perouse).  
*E. resinifera*, crimson (Como).  
*E. notabilis*, tinted purplish red (Glenbrook, 138); crimson (Glenbrook, 103).  
*E. pellita*, green (Gosford); purplish red (Wyang).  
*E. saligna*, green (Wyang and Gosford, 112); pink tint, or entirely pale green (Gosford, 33).  
*E. grandis*, puce (Bulladelah).

(3) *Stem* (Miss Flockton).

*E. punctata*, tinted pink, with a few warty glands (Acacia Creek); terete, changing to angular (Tumble-down Dick); curving, a little angular, with warty glands (Como); tinted red (Oatley).

*E. propinqua*, crimson (Rolland's Plains); angular, a few glands, shaded red (Port Stephens).

*E. botryoides*, red (Kincumber); red, becoming angular, small warty glands (La Perouse).

*E. robusta*, faintly tinted red, angular (La Perouse).

*E. resinifera*, red (Como).

*E. pellita*, slightly tinted red (Wyang).

*E. saligna*, slightly tinted pink (Wyang); at first terete, becoming angular after the first, second or third pair of leaves. Red to pink, to a pale whitish-green (Gosford); angular with warty glands (Gosford, 33).

*E. grandis*, after 2 inches (5 cm.) high becoming angular, smooth and still red at 7 inches (18 cm.) high (Bulladelah).

(4) *1st Pair of Leaves* . (Petiole, shape, vestiture).

*E. Shiressii*, petiolate, narrow-lanceolate, glabrous.

*E. punctata*, petiolate, narrow, oblong-lanceolate, petiole long, glabrous.

*E. propinqua* and *E. adjuncta*, petiolate, narrow-lanceolate, glabrous.

*E. botryoides*, petiolate, narrow oblong, glabrous.

*E. robusta* and *E. punctata* var., petiole long, narrow-lanceolate, glabrous.

*E. resinifera*, petiolate, narrow to almost linear-lanceolate, glabrous.

*E. notabilis* and *E. pellita*, petiolate, narrow-lanceolate, glabrous.

*E. saligna*, petiolate, oblong-lanceolate, glabrous.

*E. grandis*, petiolate, lanceolate, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Shiressii*, three, narrow-lanceolate, slightly undulate, glaucous-green, petiole rather long, glabrous.

*E. punctata*, three (or more), lanceolate (broader than *E. Shiressii*), slightly undulate, glaucous green, shaded red, glabrous, petiole rather long.

*E. propinqua*, five, lanceolate, undulate, light green, glabrous.

*E. adjuncta*, two, lanceolate, undulate, light green, glabrous.

*E. botryoides*, three, lanceolate, slightly undulate, light green, glabrous.

*E. robusta*, four, lanceolate, light green, glabrous.

*E. punctata* var., two (or more), lanceolate, light green, glabrous.

*E. resinifera*, three, narrow-lanceolate, light green, glabrous. (Imperfect.)

*E. notabilis*, five, narrow-lanceolate, slightly undulate, sub-recurved, firm, dark green, slightly shaded with yellowish-green, glabrous.

*E. pellita*, three, narrow-lanceolate, slightly undulate, dark green, shaded light yellowish-green, glabrous.

*E. saligna*, four. In some only two, oblong-lanceolate to lanceolate, slightly undulate, light green shaded to yellowish-green, glabrous.

*E. grandis*, four, oblong-lanceolate, firm, glaucous green shading to light yellowish-green, glabrous.

(6) *Intermediate Leaves*.

*E. Shiressii*, narrow-lanceolate, slightly undulate, dark green shading to yellowish-green. At  $7\frac{1}{2}$  inches (19 cm.),  $7\frac{1}{2}$  by 1 cm.; at  $17\frac{1}{2}$  inches (48 cm.), 6 by 1 cm.; at 30 inches (76 cm.), 10 cm. long, 1.5 cm. broad. Stem terete, pink.

*E. punctata*, broad lanceolate, slightly undulate, dark green shading to yellowish-green. Intramarginal vein distant from the edge at the base. At  $6\frac{1}{2}$  inches (16.5 cm.), 9 by 2 cm.; at 14 inches (36 cm.), 5 by  $1\frac{1}{2}$  cm. Both are almost triplinerved. Stem quadrangular, pinkish.

*E. propinqua*, narrow-lanceolate, slightly undulate, dark green shaded to yellowish-green. At 6 inches (15 cm.), 5 by 1 cm.; at 22 inches (56 cm.), 5 by  $1\frac{1}{2}$  cm. Stem quadrangular, the angles reddish.

*E. adjuncta*, lanceolate, slightly undulate, pale green shading to very pale yellowish-green. At 7 inches (18 cm.), 5 by 1 cm., stem slightly angular, green.

*E. botryoides*, lanceolate, slightly undulate, light green shading to very light yellowish-green. At 9 inches (23 cm.), 5 by  $1\frac{1}{2}$  cm. Another plant (X 68) at 31 inches (79 cm.),  $9\frac{1}{2}$  by 3 cm.; ovate lanceolate, dark green; stem terete, reddish.

*E. robusta*, narrow to broad-lanceolate, undulate, dark green shaded yellowish-green. At 7 inches (18 cm.), 5 by  $1\frac{1}{2}$  cm. Another plant (X 84) at 26 inches (66 cm.), 11 by  $3\frac{1}{2}$  cm.; stem angular, reddish.

*E. punctata* var., lanceolate or narrow-lanceolate to broad-lanceolate, undulate, light yellowish-green, shading to dark green. At  $6\frac{3}{4}$  inches (17 cm.), 7 by 2 cm.; at  $16\frac{1}{2}$  inches (42 cm.), 11 by  $2\frac{1}{2}$  cm.; and at 28 inches (71 cm.), 15 by 4 cm. Stem somewhat angular, reddish.

*E. resinifera*, lanceolate to falcate-lanceolate, slightly undulate, light green (height not stated),  $5\frac{1}{2}$  by  $1\frac{1}{2}$  cm. Stem terete.

*E. notabilis*, narrow-lanceolate, slightly undulate, margins distinctly crenulate (sometimes), dark green shading to light yellowish green, and young tips a dull moss green. At 5 inches (13 cm.), 9 by 1 cm.; at  $12\frac{1}{2}$  inches (32 cm.), 14 by  $2\frac{1}{2}$  cm.; and at  $14\frac{1}{2}$  inches (37 cm.), 11 by 2 cm. Stem terete, green or reddish.

*E. pellita*, lanceolate, undulate, green to yellowish green. At 7 inches (18 cm.), 8 by 3 cm.; at  $16\frac{1}{2}$  inches (27 cm.), 10 by 3 cm.; at 34 inches (87 cm.) high, lanceolate, undulate, dark green, 13 cm. long, 3.5 cm. broad. Stem terete, reddish.

*E. saligna*, lanceolate, slightly undulate, light yellowish green. At 17 inches (43 cm.), 7 by 2 cm.; at  $28\frac{1}{2}$  inches (72 cm.), 8 by  $2\frac{1}{2}$  cm. Stem terete, reddish.

*E. grandis*, lanceolate to broad-lanceolate, undulate, yellowish green shaded glaucous, midrib reddish. At 7 inches (8 cm.),  $4\frac{1}{2}$  by 2 cm.; at 20 inches (51 cm.), 8 by 3 cm.; at 25 inches (64 cm.), 15 by 5 cm.; and at 29 inches (74 cm.), 12 by 4 cm.; petiole rather short. stem terete, reddish.

(6a) (*Miss Flockton*).

*E. Shiressii*.

*1st leaves* lanceolate (*Galston*).

*E. punctata*.

*1st leaves* linear or narrow-lanceolate. *1st alternate leaves* the same, larger (*Acacia Creek*).

*1st leaves* lanceolate, obtuse, undersurface puce (*Gosford, 77*).

*1st leaves* ovate. *Leaves* narrow-lanceolate (*Tumble-down Dick*).

*1st leaves* lanceolate, undersurface shaded mauve, petiolate, decussate (*Manly*).

*1st leaves* ovate, undersurface glaucous with pink tint (*Como*).

*1st leaves* lanceolate, undersurface purple. *1st alternate leaves* rather larger (*Oatley*).

*E. propinqua*.

*1st leaves* lanceolate, slightly undulate, little branchlets in the axils (*Rolland's Plains*).

*1st leaves* lanceolate and ovate-lanceolate, decussate, undersurface pale green (*Port Stephens*).

*E. adjuncta*.

*1st leaves* lanceolate. *1st alternate leaves* lanceolate, slightly undulate (*Morrisett*).



*E. botryoides.*

*1st leaves* lanceolate, undersurface with glaucous and purple tint. *1st alternate leaves* lanceolate, obtuse, undersurface glaucous (Kincumber).

*1st leaves* linear, undersurface pale green or with purple tint (La Perouse).

*E. robusta.*

*1st leaves* linear or ovate. *1st alternate leaves* ovate or ovate-lanceolate (La Perouse).

*E. resinifera.*

*1st leaves* linear and lanceolate.

*E. notabilis.*

*1st leaves* lanceolate, undersurface mauve tint, edges sometimes red, petiolate, decussate (Glenbrook).

*E. pellita.*

*1st leaves* linear, sometimes becoming ovate-lanceolate. *1st alternate leaves* lanceolate, long (Wyang).

*E. saligna.*

*1st leaves* linear or narrow-ovate. *1st alternate leaves* linear or lanceolate (Wyang).

*1st leaves* lanceolate to ovate-lanceolate, edges red, midrib pale green or pink, undersurface pale green or pinkish, shortly petiolate, generally decurrent (Gosford, 112).

*1st leaves* narrow-ovate, undersurface puce tint (Gosford, A. 33).

*E. grandis.*

*1st leaves* very tiny ovate, undersurface puce. *Leaves* ovate and petiolate, undersurface pale green (Bulladelah).

## DIVISION BISECTÆ.

Series 1. Narrow throughout, or linear to narrow-oblong or narrow-lanceolate; all petiolate.

2. Narrow, then short rigid lanceolate to acuminate.
3. Linear to short-lanceolate, sessile, then long-lanceolate or narrow-lanceolate to lanceolate-acuminate.
4. Erica-like (*longicornis* and *oleosa*).
5. Flocktoniæ (after a unique species).
6. At first linear, then short and broad (*leptophylla*, *calycogona*, *gracilis*.)
7. Sessile, glaucous, broad-lanceolate, ovate, cordate to orbicular, emarginate.
8. Petiolate, lanceolate to orbicular, emarginate, glaucous to sub-glaucous.
9. Elliptical-lanceolate to lanceolate, sub-glaucous to glaucous.
10. Narrow to very broad, glaucous (*macrocarpa* and *pyriformis*).
11. Broad-elliptical to semi-deltoid, glaucous.
12. Triplinerved, broad-lanceolate, green to sub-glaucous.
13. Very broad lanceolate to almost deltoid. Stem flexuose (three Cornutæ).
14. Semi-rigid, short and broad, soon alternate (*nutans*, one of the Cornutæ, and *redunca*).
15. Stellate, ovate to orbicular, crenulate (four Cornutæ).

(*Lehmanni* and *platypus*, and to a less degree, *cornuta*, show affinity to the stellate, crenulate species of the Corymbosæ. Series 13–17 are practically Cornutæ).

## GEOGRAPHICAL.

The vast majority of the Bisectæ are endemic in Western Australia. The exceptions are—

1. Occurring in that State, but in other States also:—

*E. gracilis*, S.A., V., N.S.W.

*E. leptophylla*, SA., N.S.W.

*E. oleosa*, S.A., V., N.S.W.

*E. transcontinentalis*, S.A., N.T., V., N.S.W.

It is noticeable that practically all extend eastwards to South Australia, Victoria, and New South Wales.

2. Those which do not occur in Western Australia. They are :—

*E. Bakeri*, N.S.W. and Q.

*E. cladocalyx*, S.A.

*E. cneorifolia*, S.A.

*E. Gillii*, S.A., N.S.W.

*E. hybrida*, N.S.W.

*E. squamosa*, N.S.W.

Of these, two are confined to South Australia, and a third also extends to New South Wales, but quite adjacent to South Australia. Two are confined to New South Wales, and one occurs in New South Wales and Queensland.

Speaking generally, the *Bisectæ* belong to rather dry country. Exceptions are *hybrida* and *squamosa*, which are confined to the Sydney district, so far as we are aware; it may be that the areas in which they occur are physiologically dry.

**Series 1.—Narrow throughout. Linear to narrow-oblong or narrow-lanceolate; all petiolate.**

*E. Bakeri*.

*E. hybrida*.

*E. cneorifolia*.

*E. leptopoda*.

*E. micranthera*.

*E. spathulata*.

*General Appearance*.—Slender, leaves narrow, light green, more or less spreading. Young tips and stems reddish.

(1) *Hypocotyl*.

*E. Bakeri*, short.

*E. cneorifolia*, medium to long.

*E. micranthera*, long.

*E. hybrida*, short.

*E. leptopoda*, medium.

*E. spathulata*, medium to long.

(1a) *Hypocotyl* (Miss Flockton).

*E. Bakeri*, red, slightly angular at the top, thickening into the root (1); red, terete, smooth (2) (Ticketty Well).

*E. cneorifolia*, red, terete, thin (Kangaroo Island).

*E. micranthera*, red, terete, spindly (Lynburn, W.A.).

*E. hybrida*, red, short, smooth (Concord).

*E. leptopoda*, crimson, maintains its thickness to the root (W.A.).

*E. spathulata*, red, long, very thin (Kalgan River).

(2) *Cotyledons* (Petiole, taper).

*E. Bakeri*, V-shaped, about as long as the petiole, not tapering; petiole slender.

*E. cneorifolia*, V-shaped, about as long as the petiole, not tapering, petiole slender.

*E. micranthera*, V-shaped, about as long as the petiole, not tapering, petiole slender.

*E. hybrida*, V-shaped, unequal, not tapering, longer than the slender petiole.

*E. leptopoda*, V-shaped, slightly curved, longer than the petiole, not tapering, petiole slender.

*E. spathulata*, V-shaped, slightly curved, sometimes longer than the petiole, not tapering. petiole slender, but sometimes as broad as the cotyledon.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Bakeri*, green (1) and (2) (Ticketty Well).

*E. cneorifolia*, green.

*E. micranthera*, green (Lynburn).

*E. hybrida*, green (Concord).

*E. leptopoda*, pale green with purple tips (W.A.).

*E. spathulata*, green (Kalgan River).

(3) *Stem* (Miss Flockton).

*E. Bakeri*, terete, red, with warty glands (Ticketty Well).

*E. cneorifolia*, terete, tinted dark red.

*E. micranthera*, terete, a few depressed glands, frail and spindly (Lynburn).

*E. hybrida*, terete, red, covered with rather prominent warty glands (Concord).

*E. leptopoda*, pale, glaucous green (W.A.).

*E. spathulata*, terete, red, a few warty glands.

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Bakeri*, petiolate, linear, glabrous.

*E. cneorifolia*, petiolate, linear, glabrous.

*E. micranthera*, petiolate, linear, glabrous.

*E. hybrida*, petiolate, short, linear, \*glabrous.

*E. leptopoda*, petiolate, short linear (broader than the others), glabrous.

*E. spathulata*, petiolate, wavy, linear, glabrous.

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\* Note concerning *E. hybrida*. At Part XLII, p. 48, the suggested parents of this species are given as *E. hemiphloia*, and *E. paniculata*, from certain superficial observations which seemed to meet the case. But the cotyledons of *E. hybrida* and also the juvenile leaves, are so different from those of either of the species mentioned, that the suggested ancestry seems to be impossible.

The very narrow seedling of *E. hybrida* shows that it cannot possibly be a hybrid of *E. paniculata* and *E. hemiphloia*, as has been suggested at Part XLII, p. 48.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Bakeri*, three, linear-oblong, glabrous, sub-glaucous.

*E. cneorifolia*, two, linear-oblong, glabrous, dark green.

*E. micranthera*, five or more, linear-oblong, minutely crenulate, somewhat glaucous.

*E. hybrida*, four or more, linear-oblong, glabrous, dark green; rachis glandular.

*E. leptopoda*, three, linear-oblong to lanceolate, glabrous, sub-glaucous.

*E. spathulata*, one, linear or narrow-oblong, slightly wavy, glabrous, sub-glaucous.

(6) *Intermediate Leaves*.

*E. Bakeri*, linear to narrow-oblong or narrow-lanceolate, rigid, 4.5 cm. long, 4-5 mm. broad, veins obscure, dark green.

*E. cneorifolia*, narrow-oblong, obtuse, lax, margins undulate, 4-5 cm. long, 5 mm. broad, veins obscure, dark green.

*E. micranthera*, not seen.

*E. hybrida*, narrow-oblong lanceolate, obtuse to acute, lax, 5-6 cm. long, 5-8 mm. broad, slightly undulate, veins spreading and somewhat prominent, dark green.

*E. leptopoda*, narrow-lanceolate acute, rigid, 5-6 cm. long, 5 mm. broad, veins obscure, light green.

*E. spathulata*, narrow-lanceolate to falcate-lanceolate, undulate, 5-6 cm. long, 5-8 mm. broad, veins faint, dark green changing to yellowish-green.

## (6a) (Miss Flockton).

*E. Bakeri*.

*1st leaves* narrow linear, delicate (1).

*1st leaves* narrow-linear and linear, red edges and midrib. *1st alternate leaves* linear, red edges and venation (2) (Ticketty Well).

*E. cneorifolia*.

*1st leaves* linear, undersurface pale green.

*E. micranthera*.

*1st leaves* narrow-linear, a few glands along the margins of the leaves (Lynburn, W.A.).

*E. hybrida*.

*1st leaves* narrow-linear. *1st alternate leaves* linear or narrow lanceolate (Concord).

*E. leptopoda*.

*1st leaves* linear, pale glaucous green with pink shade on back. *1st alternate leaves* linear.

*E. spathulata*.

*1st leaves* linear.

**Series 2.—Narrow, then short rigid lanceolate to acuminate.***E. salmonophloia*.*E. erythronema*.*E. salubris*.*E. annulata*.*E. Lane-Poolei*.*E. eremophila*.

*General Appearance*.—Somewhat narrow rigid lanceolate, light green to yellowish-green, shaded glaucous.

**(1) Hypocotyl.***E. salmonophloia*, medium.*E. salubris*, long.*E. Lane-Poolei*, long.*E. erythronema*, medium to long.*E. annulata*, long.*E. eremophila*, medium.**(1a) Hypocotyl (Miss Flockton).***E. salmonophloia*, terete, red (W.A. ; Kurrawang).

*E. salubris*, tall, wiry, terete, weak, red at the base (Coolgardie); terete, red (W.A.).

*E. Lane-Poolei*, red, smooth (near Perth); terete, wiry, red (Bunup, W.A.).

*E. erythronema*, thin, weak, tinted pink or red (Cow Cowing); spindly, ridged and tinted red (W.A.).

*E. annulata*, wiry, terete, red half way up.*E. eremophila*, terete, wiry, red (Gnowangerup).**(2) Cotyledons (Petiole, taper).**

*E. salmonophloia*, V-shaped, shorter than the petiole, not tapering, petiole slender or about as broad as the cotyledons.

*E. salubris*, V-shaped, longer and broader than the petiole, not tapering.

*E. Lane-Poolei*, V-shaped, spreading, longer and broader than the petiole, petiole tapering into the base. The largest cotyledons of this series.

*E. erythronema*, V-shaped, the lobes slightly incurved, obtuse, about as long as the petiole, petiole slender.

*E. annulata*, V-shaped, about as long as the thread-like petiole.*E. eremophila*, V-shaped, about as long as the filiform petiole.**(2a) Cotyledons (Undersurface, Miss Flockton).***E. salmonophloia*, green (W.A.).*E. salubris*, slight purple tint (Coolgardie); green (W.A.).*E. Lane-Poolei*, faint mauve tint (Perth); green (Bunup).*E. erythronema*, green (Cow Cowing); green (W.A.).

(3) *Stem* (Miss Flockton).

*E. salmonophloia*, red, a few glands, becoming angular (Kurrawang).

*E. salubris*, terete, yellow green (Coolgardie).

*E. Lane-Poolei*, terete, red (Perth).

*E. erythronema*, terete, warty glands (Cow Cowing).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. salmonophloia*, petiolate, linear, glabrous.

*E. salubris*, petiolate, petiole rather long, linear-lanceolate, glabrous.

*E. Lane-Poolei*, petiolate, linear, glabrous.

*E. erythronema*, petiolate, linear, glabrous.

*E. annulata*, petiole long, linear-lanceolate, glabrous.

*E. eremophila*, petiolate, linear, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. salmonophloia*, four, linear to linear-lanceolate, shortly petiolate, glabrous light green.

*E. salubris*, four, narrow lanceolate, petiole rather long, glabrous, light green.

*E. Lane-Poolei*, five or more, linear to narrow-lanceolate, shortly petiolate, glabrous, glaucous-green.

*E. erythronema*, four, linear-lanceolate, petiolate, glabrous, light green.

*E. annulata*, three, narrow-lanceolate, petiolate, glabrous, sub-glaucous.

*E. eremophila*, three, narrow-oblong, petiolate, glabrous, sub-glaucous, shading to light green.

(6) *Intermediate Leaves*.

*E. salmonophloia*, narrow-lanceolate, shortly petiolate, somewhat rigid, 3 cm. long, 7 mm. broad, veins obscure, sub-glaucous.

*E. salubris*, narrow-lanceolate, sometimes obtuse, shortly petiolate, inclined to be rigid; at 25 inches (62 cm.), 5 to 7 cm. long, 1 to 2 cm. broad, veins thin and faint, the intramarginal vein distant from the edge in the broad leaves, olive-green to sub-glaucous.

*E. Lane-Poolei*, elliptical-lanceolate to lanceolate, shortly petiolate, firm, at 18½ in. (46 cm.), 8 cm. long, 2.5 cm. broad, veins obscure, sub-glaucous, shading to light olive-green.

*E. erythronema*, narrow-lanceolate, somewhat acuminate, petiole short, slightly undulate; at 15 in. (38 cm.), 6 cm. long, 2 cm. broad, veins obscure, sub-glaucous.

*E. annulata*, narrow to broad-lanceolate, shortly petiolate, somewhat rigid or slightly undulate; at 13 in. (33 cm.), 6 cm. long, 2 cm. broad, veins conspicuous, slightly glaucous shading to pale yellowish-green.

*E. eremophila*, narrow-lanceolate, shortly petiolate, somewhat rigid; at 20 in., (50 cm.), 8 cm. long, 1.5 cm. broad, veins somewhat conspicuous, very slightly glaucous, shading to light green.

(6a) (Miss Flockton).

*E. salmonophloia*.

*1st leaves* exceedingly fine linear (W.A.).

*1st leaves* linear. *Leaves* still opposite, narrow-ovate, height 3 inches. *1st alternate leaves* ovate to linear, the least bit paler on the undersurface (Kurrawang).

*E. salubris*.

*1st leaves* linear. *Leaves* lanceolate (Coolgardie).

*1st leaves* lanceolate, petiolate, decussate. *Leaves* beginning to be alternate, lanceolate, petiolate, decussate, undersurface paler green (W.A.).

*E. Lane-Poolei*.

*1st leaves* linear and narrow-ovate, undersurface glaucous-green (Perth).

*E. erythronema*.

*1st leaves* linear. *1st alternate leaves* narrow-lanceolate (Cow Cowing).

*E. annulata*.

*1st leaves* small linear, not channelled (Gnowangerup).

*E. eremophila*.

*1st leaves* lanceolate to ovate petiolate, midrib red, undersurface paler green (Gnowangerup).

### Series 3.—Linear to short-lanceolate, sessile, then long-lanceolate to narrow-lanceolate and acuminate-lanceolate.

*E. rigidula*.

*E. transcontinentalis*.

*General Appearance*.—At first inclined to rigid and sessile, then free, petiolate, and more or less spreading. In the early stages the colour is olive-green, which changes to light glaucous-green.

(1) *Hypocotyl*.

*E. rigidula*, long.

*E. transcontinentalis*, long.

(1a) *Hypocotyl* (Miss Flockton).

*E. rigidula*, terete, spindly, red (Comet Vale).

*E. transcontinentalis*, terete, red, weak (Hugh River, Northern Territory); long, wiry, red (Ooldea); tall, smooth, red, spindly (Cobar); red, grooved between the cotyledons (Coolabah); terete, spindly, red (Coolabah).



(2) *Cotyledons* (Petiole, taper).

*E. rigidula*, V-shaped, usually shorter than the filiform petiole, not tapering.

*E. transcontinentalis*, V-shaped, usually shorter than the scarcely filiform tapering petiole, the lobes spreading, slightly cultriform.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. rigidula*, green (Comet Vale).

*E. transcontinentalis*, slight pink tint (Hugh River, Northern Territory); slight purple tint (Ooldea); green (Cobar); faint tint of pink (Coolabah); green (Coolabah).

(3) *Stem* (Miss Flockton).

*E. transcontinentalis*, angular, pale green, edged with red partly up, smooth (Ooldea); shaded pink, tetragonal (Coolabah).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. rigidula*, shortly petiolate, linear-lanceolate, glabrous.

*E. transcontinentalis*, shortly petiolate, linear-lanceolate, shorter than in *E. rigidula*, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. rigidula*, six or more, linear to narrow-oblong, changing to narrow-lanceolate, sessile, glabrous, olive-green. Stem reddish.

*E. transcontinentalis*, six or more, linear to narrow-lanceolate, sessile, glabrous, olive green. Stem reddish.

(6) *Intermediate Leaves*.

*E. rigidula*, narrow-lanceolate or oblong lanceolate, very shortly petiolate, somewhat rigid, 4.5 cm. long, 1 cm. broad, veins obscure, olive-green.

*E. transcontinentalis*, narrow-lanceolate, sessile to very shortly petiolate, rigid, but soon changing to undulate, 5-7 cm. long, 1-1.5 cm. broad, veins obscure, subglaucous, shading to very pale light green.

## (6a) (Miss Flockton).

*E. rigidula*.

*1st leaves* linear, nearly sessile, with irregular edge, channelled. *Leaves* narrow-lanceolate, sessile (Comet Vale).

*E. transcontinentalis*.

*1st leaves* narrow-linear, channelled in the early stage, undersurface slightly paler green (Hugh River, Northern Territory).

*1st leaves* linear, channelled. *1st alternate leaves* lanceolate, pale opaque green, the venation practically invisible. Note channelled leaf (Ooldea).

*1st leaves* linear; narrow-linear (Cobar).

*1st leaves* linear, later decussate, sessile, lanceolate. *1st alternate leaves* lanceolate, sessile, glaucous green on both sides, decurrent a little (Coolabah).

*1st leaves* linear to narrow-lanceolate, decussate (Coolabah).

**Series 4.—At first linear, more or less crowding the stem, then oblong-lanceolate, almost sessile and somewhat rigid.**

*E. longicornis*, leaves dense.

*E. oleosa*, leaves scarcely dense.

*General Appearance*.—For the first 6 inches or more, *Erica*-like, then changing to oblong-lanceolate, rigid or flexuose, nearly or quite sessile, rarely exceeding 3 cm. long and 1 cm. broad, sub-glaucous.

(1) *Hypocotyl*.

*E. longicornis*, long, filiform.

*E. oleosa*, long, filiform.

(1a) *Hypocotyl* (Miss Flockton).

*E. longicornis*, terete, fragile, and a pinkish red (Wagin); terete, very slightly red (Moojebening); terete, thin, wiry, red (Southern Cross).

*E. oleosa*, terete, wiry, red (Ooldea); terete, long and weak, red (Minnipa).

(2) *Cotyledons* (Petiole, taper).

*E. longicornis*, V-shaped, usually as long as the filiform petiole, not tapering.

*E. oleosa*, V-shaped, as long or sometimes longer than the filiform petiole, not tapering, lobes not rigid, often somewhat curved.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. longicornis*, green (Wagin, Moojebening and Southern Cross).

*E. oleosa*, green (Ooldea).

(3) *Stem* (Miss Flockton).

*E. longicornis*, terete and red (Wagin); terete, ribbed, red (Moojebening); terete at first, afterwards ribbed, tinted pink (Southern Cross).

*E. oleosa*, terete, ribbed, red (Ooldea); terete, weak, red (Minnipa).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. longicornis*. They are so slender that it is difficult to say whether they are sessile or not, they are less than a line broad, and about as broad as the cotyledons; glabrous.

*E. oleosa*, similar to *E. longicornis*.

(5) *Subsequent Pairs of Leaves.**E. longicornis*, none.*E. oleosa*, none.

The early leaves of both species are very slender, almost filiform, heath-like, crowding the stem for 6 to 12 inches before they change, they are usually 1.5 cm. long, about 1 mm. broad, or perhaps  $1\frac{1}{2}$  mm. broad, light green.

(6) *Intermediate Leaves.*

*E. longicornis*, narrow-lanceolate to oblong-lanceolate, curved or straight, somewhat rigid in the broadest stage, very shortly petiolate; at 15 in. (38 cm.), 2.5 cm. long, 1 cm. broad, veins obscure, light glaucous green.

*E. oleosa*, narrow spathulate to narrow-lanceolate, or oblong lanceolate, acute, more rigid than in *E. longicornis*, shortly petiolate; at 18 in. (45 cm.), 2 cm. long, 1 cm. broad, veins obscure, light glaucous green.

## (6a) (Miss Flockton).

*E. longicornis.**1st leaves* very narrow linear, deeply grooved (Wagin).

*1st leaves* exceedingly narrow linear. *Leaves* small, ovate, almost sessile on three sides of stem (Moojebening).

*1st leaves* very narrow linear. *1st alternate leaves* ovate (Southern Cross).*E. oleosa.*

*1st leaves* very narrow-linear, channelled, arranged in threes, after the two first pairs (Ooldea).

*1st leaves* very narrow linear. *Leaves* narrow-ovate, pointed tips, shortly petiolate (Minnipa).

**Series 5.—Flocktoniæ, at first linear, then lanceolate, sessile, changing to winged, or the lamina, decurrent for a short distance on the stem.**

*E. Flocktoniæ.*

*General Appearance.*—Narrow, intermixed with broader leaves, then all broadish lanceolate, decurrent and winged, eventually changing to long lanceolate and still sessile before the adult stage is reached. Glaucous and quadrangular throughout. (See Part XXXIX, p. 281).

(1) *Hypocotyl.*

Long, filiform.

(1a) *Hypocotyl* (Miss Flockton).

Long, wiry, angular, crimson (W.A.); terete, wiry, red (Cow Cowing).

(2) *Cotyledons* (Petiole, taper).

V-shaped, about as long as the filiform petiole, not tapering, usually spreading.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

Green, with sometimes a purple tip (W.A.); green (Cow Cowing).

(3) *Stem* (Miss Flockton).

Angular, prominent oil-glands, crimson (W.A.); angular, red (Cow Cowing); crimson (W.A. No. 2).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

Shortly petiolate, linear or less than a line broad, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

Two, linear, glabrous. The next four or six leaves are linear, alternate, and above them the leaves again become opposite, and vary from linear-lanceolate to cordate-lanceolate, sessile. They then pass from this stage into broad-lanceolate, decurrent and finally winged, decussate, spreading or recurved. One drawing shows them still opposite at 23 in., and 3 cm. long and 1.5 cm. broad. As they approach the alternate stage they are less winged, becoming decurrent and finally shortly petiolate. The colour throughout the various stages is glaucous. Stems quadrangular, winged.

(6) *Intermediate Leaves*.

Long narrow lanceolate, curved inwards, decurrent to shortly petiolate, 8 cm. long, 1.5 cm. broad, light green shaded glaucous.

## (6a) (Miss Flockton).

*1st leaves* narrow linear, alternate. The first leaves are alternate, afterwards becoming opposite. As development proceeds, and while the leaves are opposite, they become decurrent in a remarkable degree (W.A.).

*1st leaves* very narrow-linear, channelled and inclined to become alternate at once, decurrent. Note, leaves decurrent and stem angular (Cow Cowing).

*1st leaves* linear. After the linear leaves, the next are winged and decurrent, broad at the base and tapering to a fine point. Very glaucous (W.A., No. 2).

### Series 6.—At first linear, then short and broad.

*E. leptophylla.*

*E. calycogona.*

*E. gracilis.*

*General Appearance.*—Slender, semi-glaucous, at first slender with fairly numerous linear, erect or spreading leaves, then changing to short lanceolate, and, in some cases, to almost elliptical-lanceolate, rarely reaching two inches long throughout.

(1) *Hypocotyl*.

<i>E. leptophylla</i>	} Long, filiform.
<i>E. calycogona</i>	
<i>E. gracilis</i>	

(1a) *Hypocotyl* (Miss Flockton).

*E. leptophylla*, terete, wiry, red (Ballandry, N.S.W.); terete, slightly tinted red, spindly (Inglewood, Vic.); tall, smooth, weak, tinted red (Perth, W.A.).

*E. calycogona*, terete, wiry, red (Sea Lake, Vic.); thin, smooth, red (Kamerooka, Vic.); terete, slight, weak, tinted pink (Eyre's Peninsula).

*E. gracilis*, terete, wiry, red (Eyre's Peninsula and Fowler's Bay, S.A., Southern Cross, W.A.).

(2) *Cotyledons* (Petiole, taper).

*E. leptophylla*, V-shaped, about as long, or sometimes shorter than the filiform petiole, and sometimes as fine as the petiole, not tapering.

*E. calycogona*, V-shaped, the lobes oblong to obovate, usually shorter than the filiform petiole, slightly tapering.

*E. gracilis*, V-shaped, oblong, usually longer than the filiform petiole, slightly tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. leptophylla*, green (Inglewood, Vic., and Perth, W.A.).

*E. calycogona*, green (Sea Lake, Kamerooka, and Eyre's Peninsula).

*E. gracilis*, green (Eyre's Peninsula, Fowler's Bay and Southern Cross).

(3) *Stem* (Miss Flockton).

*E. calycogona*, weak and spindly at 6½ in. high (Sea Lake, Vic.); terete, red (Kamerooka, Vic.); terete, tinted red, a few glands (Eyre's Peninsula).

*E. gracilis*, green and red, terete or a little ribbed (Southern Cross).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. leptophylla*, petiolate, linear, glabrous.

*E. calycogona*, petiolate, linear, but slightly broader than *E. leptophylla*, glabrous.

*E. gracilis*, petiolate, linear, glabrous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. leptophylla*, nine or more, narrow-oblong, glabrous, sub-glaucous.

*E. calycogona*, four, narrow-oblong to narrow-lanceolate, glabrous, light green to sub-glaucous.

*E. gracilis*, six, narrow-lanceolate, pale green to slightly glaucous.

(6) *Intermediate Leaves.*

*E. leptophylla*, ovate to narrow-oblong, acute, shortly petiolate or almost sessile, somewhat rigid, at 7 in. (18 cm.), 2.5 cm. long, 12 mm. broad; at 13 in. (33 cm.), 4 cm. long, 12 mm. broad, veins obscure, sub-glaucous; stem terete, sub-glaucous.

*E. calycogona*, narrow to broadish lanceolate, slightly undulate, at first very shortly petiolate, but at a later stage the petiole well defined; at 6½ in. (16 cm.), 2.5 cm. long, 7 mm. broad; at 27 in. (68 cm.), 3 cm. long, 15 mm. broad, at this stage the venation somewhat prominent, spreading, slightly glaucous, shading to yellowish-green. Stem terete, very pale purple-brown.

*E. gracilis*, ovate-lanceolate, rather obtuse, shortly petiolate; at 10 in. (25 cm.), 3 cm. long, 12 mm. broad, veins spreading, obscure; at 15 in. (38 cm.), still lanceolate, obtuse, 4 cm. long, 1.5 cm. broad, sub-glaucous. Stem terete, at first green, but later changing to purple.

## (6a) (Miss Flockton).

*E. calycogona.*

*1st leaves* very narrow linear, channelled slightly. *Leaves* narrow-ovate, shortly petiolate (Sea Lake).

*1st leaves* linear to ovate. *1st alternate leaves* ovate, thick, pale glaucous-green, pedicle short, the same colour on both sides (Kamehoka).

*1st leaves* lanceolate, petiolate, undersurface slightly paler green. *Leaves* small, ovate, petiolate, alternate after the fourth pair of leaves. Later, leaves ovate and mostly trinerved (Eyre's Peninsula).

*E. gracilis.*

*1st leaves* linear, petiolate, not channelled (Eyre's Peninsula).

*1st leaves* exceedingly small, linear, not channelled (Fowler's Bay).

*1st leaves* narrow-lanceolate. *1st alternate leaves* long (1¾ in.), narrow-lanceolate (Southern Cross).

**Series 7.—Sessile, broad-lanceolate, ovate, cordate to orbicular, emarginate.**

*E. Gillii.*

*E. Kruseana.*

*E. crucis.*

*E. uncinata.*

*E. decurva.*

*General Appearance.*—Glaucous throughout. Stem-clasping to sessile, all short and broad, from emarginate to acute, all less than 5 cm., usually about 3 cm. long.

This Series somewhat resembles that of Bilobæ No. 14 (*E. rubida*, *E. cordata*, *E. pulverulenta*).

(1) *Hypocotyl*.

*E. Gillii*, medium to long.

*E. crucis*, medium to long, filiform.

*E. Kruseana*, long.

*E. uncinata*, long.

*E. decurva*, medium.

(1a) *Hypocotyl* (Miss Flockton).

*E. Gillii*, crimson (Flinders Range); terete, red (Broken Hill).

*E. crucis*, terete, wiry and red, glaucous towards cotyledon and stem (Southern Cross).

*E. Kruseana*, terete, slight, weak, tinted pink.

*E. uncinata*, terete, red, wiry (Cow Cowing); terete, pink, wiry (Hopetoun); terete, wiry, slightly tinted red (Bremer Bay).

*E. decurva*, pink (W.A.).

(2) *Cotyledons* (Petiole, taper).

*E. Gillii*, V-shaped, about as long as the petiole, sometimes curved and spreading, slightly tapering into the petiole.

*E. crucis*, V-shaped, about as long as the petiole, which is sometimes filiform, slightly tapering into the petiole when broad.

*E. Kruseana*, V-shaped, about as long as the filiform petiole, oblong, acute, not tapering. The smallest of this series.

*E. uncinata*, V-shaped, longer than the short thickish petiole, oblong-lanceolate, not tapering.

*E. decurva*, crescent-shaped, broad, slightly tapering into the petiole, the lobes shorter than the petiole, glaucous.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Gillii*, green (Flinders Range); purple tint (Broken Hill).

*E. crucis*, glaucous-green.

*E. Kruseana*, green.

*E. uncinata*, green (Cow Cowing and Hopetoun).

*E. decurva*, horizontal. We have two pairs of cotyledons parallel to each other. As growth proceeds we have crutch-shaped cotyledon leaves with petioles.

(3) *Stem* (Miss Flockton).

*E. Gillii*, angular, shaded red (Flinders Range); slightly angular, red (Broken Hill).

*E. Kruseana*, weak, terete, red at the base, shading to pink and later powdery white.

*E. uncinata*, terete or slightly flattened, glands prominent, pale yellow-green, shaded with pink a little way up (Cow-Cowing).

*E. decurva*, terete, glaucous and showing annular scars of fallen leaves (Kaiga Plains).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Gillii*, petiolate to nearly sessile, linear, glabrous.

*E. crucis*, petiolate, lanceolate, glabrous, glaucous.

*E. Kruseana*, slightly petiolate, linear-lanceolate, glabrous, glaucous.

*E. uncinata*, slightly petiolate, linear-lanceolate, glabrous.

*E. decurva*, sessile or nearly so, narrow, oblong, glabrous, glaucous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Gillii*, nine or more (numerous), the three first narrow, oblong, the remainder cordate-lanceolate, slightly undulate, glaucous.

*E. crucis*, seven or more (? numerous), the first three pairs narrow-lanceolate, the remainder orbicular, apiculate, sessile, glaucous.

*E. Kruseana*, eight or more (? numerous), narrow-lanceolate to elliptical, glaucous.

*E. uncinata*, six or more (? numerous), still opposite at 2 feet. The first three or four pairs narrow-lanceolate to elliptical, shortly petiolate, the remainder cordate to orbicular and also emarginate, glaucous.

*E. decurva*, six more more (? numerous), obovate to ovate, sessile, glaucous.

(6) *Intermediate Leaves*.

*E. Gillii*

*E. crucis* : Not seen.

*E. Kruseana*

*E. uncinata*, orbicular, emarginate, sessile to shortly petiolate, veins faint, spreading, glaucous, the young tips shading to madder-like. There is probably another stage before the adults are reached.

At 31 in. (78 cm.) high, still opposite and close together, reniform, emarginate, sessile and glaucous, 1.5 cm. long and as broad (Bremer Bay). 23 in. (58 cm.) high, still opposite, sessile, ovate-lanceolate, or acutely lanceolate, glaucous or nearly so, 2.5 cm. long and as broad (Hopetoun, J.H.M.).

*E. decurva*, not seen.



(6a) (Miss Flockton).

*E. Gillii.*

*1st leaves* lanceolate, opposite. *1st alternate leaves* stem-clasping, not decurrent. The leaves after the fourth or fifth pair become ovate-lanceolate and very sinuous, still opposite and some inclined to be decurrent. Stem-clasping, unchanged at 15 inches except that the leaves are a little longer (Flinders Range).

*1st leaves* narrow-linear, sessile, later ovate-lanceolate, decussate, sessile. Some of the older leaves are decurrent (Broken Hill).

*E. crucis.*

*1st leaves* linear lanceolate.

*E. Kruseana.*

*1st leaves* narrow-lanceolate, petiolate, later ovate to broadly ovate, very short pedicel, undersurface slightly paler green, decussate.

*E. uncinata.*

*1st leaves* linear, afterwards ovate, stem-clasping, pale opaque-green, alike on both sides. *Leaves* long ovate, changing to cordate, sessile.

*E. decurva.*

*1st leaves* ovate or narrow-ovate, glaucous, same colour on both sides. *Leaves* oblong or nearly orbicular, glaucous (Kalgan Plains).

*1st leaves* oblanceolate and lanceolate, glaucous-green.

### Series 8.—Petiolate, lanceolate to orbicular, emarginate, sub-glaucous to glaucous.

*E. Websteriana.*

*E. falcata.*

*E. decipiens.*

*E. cladocalyx.*

*General Appearance.*—Orbicular, emarginate, petiolate, glaucous shading to dark green, sometimes broader than long, i.e.,  $3\frac{1}{2}$  by 4 cm., usually about  $2\frac{1}{2}$  by 3 cm.

(1) *Hypocotyl.*

*E. Websteriana*, long, filiform, pink.

*E. decipiens*, long, filiform, pink.

*E. falcata*, medium, filiform, pink.

*E. cladocalyx*, medium to long, filiform, but thicker than the three preceding.

(1a) *Hypocotyl* (Miss Flockton).

*E. Websteriana*, terete, frail, tinted pink (Tarcoola Blocks).

*E. decipiens*, terete, wiry, widening slightly towards the base, pink (Perth); terete, wiry, slightly tinted red (Bridgetown).

*E. falcata*, red (Hopetoun); red, tapers into the root (W.A.).

*E. cladocalyx*, pink (S.A.); smooth, red, with warty glands (Port Lincoln); terete, ribbed, spindly, red (Campbelltown, cultivated).

(2) *Cotyledons* (Petiole, taper).

*E. Websteriana*, shaped like a horse-shoe, longer than the very short thickish petiole, pinkish underneath, not tapering.

*E. decipiens*, V-shaped, diverging, acute, longer than the thickish petiole, tapering into the petiole.

*E. falcata*, V-shaped, about as long as the filiform petiole, not tapering.

*E. cladocalyx*, oblong-reniform to broadly-bilobed; when the former, not tapering into the petiole, but when the latter, distinctly tapering into the petiole; the lower portion of the petiole filiform.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. Websteriana*, pink (Tarcoola Blocks).

*E. falcata*, green (Hopetoun); pale purple (W.A.).

*E. cladocalyx*, red tint (Port Lincoln); green, with a slight mauve tint (Campbelltown).

(3) *Stem* (Miss Flockton).

*E. Websteriana*, terete, tinted pink, becoming glandular (Tarcoola Blocks).

*E. falcata*, terete, shaded pink (Hopetoun); with warty glands above the cotyledons (W.A.).

*E. cladocalyx*, smooth, red (S.A.); terete, becoming angular, a few glands (Campbelltown, cultivated).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. Websteriana*, shortly petiolate, linear, sub-glaucous.

*E. decipiens*, shortly petiolate, linear, green.

*E. falcata*, shortly petiolate, linear, green.

*E. cladocalyx*, petiolate, lanceolate, light green. The species with the broadest leaves.

(5) *Subsequent pairs of leaves* (Number, shape, vestiture).

*E. Websteriana*, three, narrow-lanceolate to broad-lanceolate, sub-glaucous. The leaves of this Series are all short leaves, hence the term broad-lanceolate.

*E. decipiens*, three, oblong, then narrow-lanceolate, the last pair broad-lanceolate, subglaucous.

*E. falcata*, four, three pairs narrow oblong or linear, the fourth pair broad-lanceolate, undulate, very pale glaucous.

*E. cladocalyx*, two, second pair narrow-lanceolate, tapering into a long petiole, third pair broad-lanceolate or elliptical-lanceolate, petiole long, dark green.

(6) *Intermediate Leaves.*

*E. Websteriana*, ovate, broad cuneate to broadly spatulate, emarginate to apiculate, petiole rather long, veins faint, spreading. At 13 inches 15 mm. long, 18 mm. broad, glaucous.

*E. decipiens*, orbicular, emarginate, the midrib sometimes terminating in a short mucro, while the leaf is still emarginate; petiole short. At 22 inches 3.5 cm. long, 4.5 cm. broad, veins fairly prominent, spreading and curving upwards and inwards, the median nerve somewhat distant from the edge, glaucous.

*E. falcata*, shortly petiolate, broadly elliptical, 5 cm. long, 3 cm. broad, veins faint, spreading, very light green.

*E. cladocalyx*, petiole rather long, orbicular, emarginate, undulate, the margins turned upwards, forming a scoop. At 29 inches 5.5 cm. long by 4 cm. broad, dark green, veins prominent, distant, stem reddish.

(6a) (Miss Flockton).

*E. Websteriana.*

*1st leaves* narrow-lanceolate. *Leaves* obcordate (Tarcoola Blocks).

*E. falcata.*

*1st leaves* linear. *1st alternate leaves* ovate-sinuous. This plant branches from the axils of the first leaves after the cotyledons (Hopetoun).

*1st leaves* lanceolate, then rhomboidal or ovate, undulate. *1st alternate leaves* obcordate. petiolate (W.A.).

*E. cladocalyx.*

*1st leaves*, first pair lanceolate. *1st alternate leaves* ovate-orbicular, sometimes retuse, inclined to be recurved, red edges, young growth very red (S.A.).

*1st leaves* broadly ovate, petiolate, decussate (Campbelltown).

**Series 9.—Elliptical-lanceolate to lanceolate, sub-glaucous to glaucous.**

*E. squamosa.*

*E. Oldfieldi*

*E. Campaspe.*

*General Appearance.*—At 10 inches (25 cm.), all short and broad, *i.e.*, elliptical lanceolate to lanceolate, subglaucous, usually 4 by 2 cm. *E. Campaspe* is more glaucous than the others, and has the leaves more acute.

(1) *Hypocotyl.*

*E. squamosa*, short to medium, filiform, pink.

*E. Oldfieldi*, medium to long, filiform, pink.

*E. Campaspe*, medium, filiform, pink.

(1a) *Hypocotyl* (Miss Flockton).

*E. squamosa*, very short, red (Como); red (National Park); terete, thin, red (Gosford).

*E. Oldfieldi*, red (Cow Cowing); long, feeble, smooth and red (Minginew).

*E. Campaspe*, terete, weak, wiry, tall, red at the base (Coolgardie).

(2) *Cotyledons* (Petiole, taper).

*E. squamosa*, V-shaped, longer than the filiform petiole, slightly tapering, purplish on the lower surface.

*E. Oldfieldi*, V-shaped, oblong, shorter than the petiole, not tapering.

*E. Campaspe*, V-shaped, longer than the filiform petiole, lanceolate to obovate slightly tapering into the petiole.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. squamosa*, red (National Park; Gosford). (Unusual colour in bisected cotyledons.)

*E. Oldfieldi*, purple tint (Minginew).

*E. Campaspe*, slight purple tint (Coolgardie).

(3) *Stem* (Miss Flockton).

*E. squamosa*, terete, shaded red (Como); pale green, pink shade at the base (National Park).

*E. Oldfieldi*, terete, light brown (Minginew).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. squamosa*, petiolate, linear, acute, glabrous, green.

*E. Oldfieldi*, petiolate, linear, acute, glabrous, green.

*E. Campaspe*, petiolate, linear, acute, subglaucous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).*E. squamosa*, four, linear to narrow-lanceolate, subglaucous.*E. Oldfieldi*, four, narrow-lanceolate, slightly subglaucous.*E. Campaspe*, three or more, linear, changing to narrow-lanceolate, subglaucous.(6) *Intermediate Leaves*.*E. squamosa*, lanceolate to elliptical, petiole medium. At 22 in. (55 cm.), 4 cm. long, 2.5 cm. broad, veins moderately distinct, spreading, slightly glaucous, tipped with yellowish green.*E. Oldfieldi*, lanceolate to elliptical, petiole short. At 7½ in. (19 cm.), 3.5 cm. long, 2 cm. broad, somewhat rigid, veins obscure, slightly glaucous, shading to a very pale green.*E. Campaspe*, lanceolate, petiole short. At 11 in. (28 cm.), 4 cm. long, 1.5 cm. broad, rigid, veins obscure, glaucous, the young tips glaucous to moss green.

## (6a) (Miss Flockton).

*E. squamosa*.*1st leaves* linear (Como).*1st leaves* linear, pale green, undersurface pink. *1st alternate leaves* ovate-lanceolate and ovate-acute (National Park).*1st leaves* linear, very narrow, undersurface pale mauve (Gosford).*E. Oldfieldi*.*1st leaves* linear (COW COWING).*1st leaves* linear to lanceolate. *1st alternate leaves* ovate, thick, shortly petiolate, the same colour on both sides. (Minginev).**Series 10.—Narrow to very broad, glaucous.***E. macrocarpa*.*E. pyriformis* var. *elongata*.*E. pyriformis*.*E. Kingsmilli*.*General Appearance*.—Glaucous and broad; at 10 in. (25 cm.), 5 by 3 cm., ovate to ovate-lanceolate.(1) *Hypocotyl*.*E. macrocarpa*, long, pink.*E. pyriformis*, short to long, pink.var. *elongata*, medium, pink.*E. Kingsmilli*, short, filiform, pink.(1a) *Hypocotyl* (Miss Flockton).*E. macrocarpa*, long, red (W.A.).*E. pyriformis*, short red (W.A., 7540-14); red, thickens to the root (W.A., 44).var. *elongata*, terete, red (W.A.).*E. Kingsmilli*, terete, very slight and weak, pink.

(2) *Cotyledons* (Petiole, taper).

*E. macrocarpa*, V-shaped, slightly undulate, longer than, and tapering into the filiform petiole, subglaucous.

*E. pyriformis*, V-shaped, slightly undulate, about as long as the petiole, glaucous, shaded pink.

var. *elongata*, V-shaped, slightly undulate, incurved, sometimes shorter than the filiform petiole, subglaucous.

*E. Kingsmilli*, V-shaped, slightly curved downwards, about as long as the filiform petiole, glaucous or nearly so.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. macrocarpa*, pink tinted (W.A.).

*E. pyriformis*, whitish pink (W.A. 7540); purple shade at back (W.A., 44).

var. *elongata*, slight reddish tint.

*E. Kingsmilli*, green.

(3) *Stem* (Miss Flockton).

*E. macrocarpa*, red, angular.

*E. pyriformis*, powdery white, tinted pink (7540); terete, shaded pink to glaucous green (44).

var. *elongata*, terete, red.

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. macrocarpa*, narrow-lanceolate, tapering into a fairly long petiole, glaucous.

*E. pyriformis*, petiolate, narrow-lanceolate, glaucous.

var. *elongata*, petiolate, linear to narrow-lanceolate, glaucous.

Too young to be entirely satisfactory.

*E. Kingsmilli*, petiolate, linear, glaucous. Too young to be entirely satisfactory.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. macrocarpa*, five or more, second and third pairs narrow-lanceolate, fourth and fifth pairs spatulate to almost oblong-lanceolate, glaucous.

*E. pyriformis*, five or more, ovate to elliptical, glaucous.

var. *elongata*, two or more, glaucous (imperfect).

*E. Kingsmilli*, two or more, glaucous (imperfect).

(6) *Intermediate Leaves*.

*E. macrocarpa*, not seen.

*E. pyriformis*, broadly ovate, obtuse, thick, shortly petiolate. At 10 in. (18 cm.) 7 cm. long, 4 cm. broad, veins somewhat prominent, subglaucous to yellowish-green.

var. *elongata*, not seen.

*E. Kingsmilli*, not seen.

## (6a) (Miss Flockton).

*E. macrocarpa*.

*1st leaves* linear, afterwards spatulate, ovate or elliptical, glaucous, opposite.

*E. pyriformis.*

*1st leaves* linear, a little incurved at the tip, undersurface whitish-pink (7,540).

*1st leaves* ovate, undersurface pale glaucous green (44).

var. *elongata.*

*1st leaves* linear or linear-ovate.

*E. Kingsmilli.*

*1st leaves* linear, petiolate.

**Series 11.—Broad-elliptical to semi-deltoid, glaucous.***E. caesia.**E. fœcunda.**E. accedens.*

*General Appearance.*—At 10–12 in. (25–30 cm.), broadly elliptical, obtuse, or with a very small point, glaucous, changing to yellowish and sometimes dark green. Rarely exceeding 5 cm. long and 3 cm. broad.

(1) *Hypocotyl.*

*E. caesia*, short, pink.

*E. fœcunda*, medium to long, filiform, pink.

*E. accedens*, medium to long, filiform, pink.

(1a) *Hypocotyl* (Miss Flockton).

*E. caesia*, terete, wiry, red (Dowerin).

*E. fœcunda*, terete, red (W.A., Murphy).

*E. accedens*, terete, red (Woorooloo); tall, very slight, red (York).

(2) *Cotyledons* (Petiole, taper).

*E. caesia*, V-shaped, slightly undulate, oblong to slightly spatulate, about as long as the filiform petiole, faintly glaucous, slightly tapering.

*E. fœcunda*, V-shaped, about as long as the very filiform petiole, green, not tapering. (Very much smaller than *E. caesia*.)

*E. accedens*, V-shaped, diverging, about as long as the filiform petiole, slightly tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. caesia*, green, with a slight smudge of purple (Dowerin).

*E. fœcunda*, green (W.A., Murphy); pink shade (W.A., 217).

*E. accedens*, pale green (Woorooloo); pink tint (York).

(3) *Stem* (Miss Flockton).

*E. fœcunda*, crimson (W.A., 217); red (Cow Cowing).

*E. accedens*, terete, red, becoming very glaucous-pink, almost white (York).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. casia*, petiolate, linear-lanceolate, glabrous, slightly glaucous.

*E. fœcunda*, petiolate, narrow-lanceolate, glabrous, olive-green or light green.

*E. accedens*, petiolate, narrow oblong-lanceolate, glabrous, very glaucous, sometimes tinged with very pale purple-brown.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. casia*, three, second pair narrow-lanceolate, third and fourth pairs ovate or elliptical, veins prominent, olive-green shading to glaucous.

*E. fœcunda*, four, ovate, blunt, veins obscure, olive-green, with a tinge of glaucousness, glabrous.

*E. accedens*, one, narrow-lanceolate, venation obscure, glabrous, very glaucous, midrib purple-brown.

(6) *Intermediate Leaves*.

*E. casia*, ovate to semi-deltoid, emarginate, shortly petiolate. At 6 in. (15 cm.), 3.5 cm. long, 3 cm. broad, veins obscure, dark green.

*E. fœcunda*, ovate to semi-deltoid, apiculate, margins subcrenate and undulate, petiole short. At 10 inches (25 cm.), 5 cm. long, 3.5 cm. broad, veins fairly prominent, the intramarginal vein distant from the edge, glaucous.

*E. accedens*, ovate-elliptical to semi-deltoid, then passing into very broad lanceolate, petiole rather long. At 12 in. (30 cm.), 5.5 cm. long, 3.5 cm. broad; at 17 (43 cm.), 8 cm. long, 7 cm. broad; at 25 in. (62 cm.), 11 cm. long, 7.5 cm. broad, glaucous, veins distinct, intramarginal vein distant from the edge.

## (6a) (Miss Flockton).

*E. casia*.

*1st leaves* linear with irregular edge, tapering into a long petiole. *Leaves*, this plant at 2½ inches has changed to broad ovate, almost orbicular (Dowerin).

*E. fœcunda*.

*1st leaves* very small lanceolate and ovate, petiolate. *Leaves* ovate, petiolate, decussate, the same colour on both sides, becoming glaucous. At 10 inches high the leaves are glaucous (W.A., A. Murphy).

*1st leaves* linear. *1st alternate leaves* ovate (W.A., 217).

*1st leaves* linear or lanceolate. *1st alternate leaves* ovate (Cow Cowing).

*E. accedens*.

*1st leaves* lanceolate and ovate, glaucous, decussate, venation hardly visible (Woorooloo).

*1st leaves* lanceolate, pale glaucous green on both sides, but undersurface whiter. *1st alternate leaves* ovate or acuminate, very glaucous on both sides (York).



**Series 12.—Triplinerved, broad-lanceolate, green to sub-glaucous.**

*E. gomphocephala*.

*E. redunca* var. *elata*.

*E. Gardneri* (imperfect).

*General Appearance*.—Broad lanceolate, free and spreading, subglaucous to glaucous, triplinerved.

(1) *Hypocotyl*.

*E. gomphocephala*, long, filiform, pink.

*E. redunca* var. *elata*, medium to long, filiform, pink.

*E. Gardneri*, short, filiform, pale pink.

(1a) *Hypocotyl* (Miss Flockton).

*E. gomphocephala*, terete, tinted red (Perth); red (W.A.).

*E. redunca* var. *elata*, weak, smooth, red (Baylup); long, feeble, smooth, red (Kalgan Plains); shaded red (W.A. 9) (*redunca*).

*E. Gardneri*, terete and faintly tinted with pink (Bendering).

(2) *Cotyledons* (Petiole, taper).

*E. gomphocephala*, oblong reniform to nearly triangular, diverging, slightly longer than the petiole, tapering into the petiole, green.

*E. redunca* var. *elata*, V-shaped, about as long as the filiform petiole, not tapering, green to subglaucous.

*E. Gardneri*, V-shaped, much longer than the very short filiform petiole, not tapering green.

(2) *Cotyledons* (Undersurface, Miss Flockton).

*E. redunca* var. *elata*, green (Baylup); purple tint (Kalgan Plains).

*E. redunca* var. *elata*, pale green (W.A. 9); red W.A. 5.06).

*E. Gardneri*, green (Bendering).

(3) *Stem* (Miss Flockton).

*E. gomphocephala*, red (W.A.).

*E. redunca* var. *elata*, terete, tinted red (Baylup); pale green, angular, with protuberant glands (W.A., 9); red (W.A. *redunca*).

*E. Gardneri*, terete, pale green (Bendering).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. gomphocephala*, petiolate, petiole long, narrow lanceolate, glabrous, light green.

*E. redunca* var. *elata*, petiolate, petiole long, narrow lanceolate, glaucous.

*E. Gardneri*, shortly petiolate, linear-oblong to linear-lanceolate, much smaller than in *E. redunca*, pale green.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. gomphocephala*, one, lanceolate, somewhat obtuse, glabrous, light green.

*E. redunca* var. *elata*, one, lanceolate, obtuse, glabrous, glaucous.

*E. Gardneri*, one, linear lanceolate, glabrous, light green.

(6) *Intermediate Leaves*.

*E. gomphocephala*, ovate lanceolate, shortly acute, petiole long; at 11 in. (28 cm.), 6.5 cm. long, 4 cm. broad, venation prominent, intramarginal nerve distant from the edge; at 17 in. (43 cm.), 5 cm. long, 3 cm. broad, distinctly triplinerved, and also at 28 in. (70 cm.), olive green, stem green. At 30 in. (75 cm.), high, leaves alternate, lanceolate, thin, margins slightly crenulate, 5 cm. long, 2.5 cm. broad. Petioles slender, about 1.5 cm. long. Some of the leaves are slightly concave and inclined to be boat-shaped, and not unlike some peltate leaves of the *Corymbosæ*. Stems yellowish-green.

*E. redunca* var. *elata*, broad lanceolate-obtuse to lanceolate-acute, triplinerved, petiole medium. At 7½ in. (19 cm.), 6 cm. long, 3.5 cm. broad, only the two distant intramarginal nerves prominent and the midrib, which is a deep purple-brown as well as the petiole; at 20 in. (50 cm.), 10 cm. long, 4 cm. broad, light glaucous green. Stem rich purple brown.

*E. Gardneri*, lanceolate-acute, margins slightly undulate, petiole short, 4 cm. long, 1.5 cm. broad, veins faint, olive-green tinged with glaucousness. Stem light green.

## (6a) (Miss Flockton).

*E. gomphocephala*.

*1st leaves* ovate alternate (W.A.).

*E. redunca* var. *elata*.

*1st leaves* linear and lanceolate, undersurface a little paler green. *1st alternate leaves* broadly lanceolate, dull whitish green (Baylup).

*1st leaves* ovate lanceolate, glaucous (Kalgan Plains).

*E. redunca* var. *elata*.

*1st leaves* broadly ovate with midrib coloured red. *1st alternate leaves* large, ovate, with red midrib (W.A. 9).

*1st leaves* linear, sometimes ovate, glaucous green. *1st alternate leaves* narrow-lanceolate (W.A. 5.06).

*E. Gardneri*.

*1st leaves* narrow-lanceolate. *Leaves* lanceolate, shortly petiolate (Bendering).

**Series 13.—Very broad lanceolate to almost deltoid. Stem flexuose.**

*E. Stowardi.*

*E. astringens.*

*E. occidentalis.*

*General Appearance.*—Broad lanceolate to acuminate, undulate, venulose, glaucous to yellowish-green.

(1) *Hypocotyl.*

*E. occidentalis.* "Erect, terete, glabrous, 1.5 to 2.2 cm. long, stained with red." (Lubbock.)

*E. Stowardi*, long, filiform, pink.

*E. astringens*, long, filiform, pink.

*E. occidentalis*, long, filiform, pink.

(1a) *Hypocotyl* (Miss Flockton).

*E. Stowardi*, terete, very thin and wiry, shaded red (Uberin Hill).

*E. astringens*, terete, red and wiry (Wagin); terete, red at base and becoming much lighter towards the cotyledons (Hamel); terete, red (Kalgan Plains, 30 and 45) (Scrub form); tall, weak, tinted red (Kalgan Plains); resow of 45 (Scrub form).

*E. occidentalis*, terete, red, spindly (Paringillup); long, 2 inches, slightly angled, red (Wickepin); thin, smooth, tinted red (Porongorup).

(2) *Cotyledons* (Petiole, taper).

*E. occidentalis.* "Deeply bilid, petiolate, glabrous, dark green, indistinctly nerved; lobes oblong, narrow, obtuse." (Lubbock.)

*E. Stowardi*, broadly V-shaped, the lobes deeply cleft, obtuse, longer than the filiform petiole, slightly tapering, glaucous.

*E. astringens*, V-shaped, about as long as the petiole, slightly tapering, green.

*E. occidentalis*, V-shaped, the lobes obtuse and slightly unequal, shorter than the slender petiole, slightly tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. astringens*, tinted very slightly with red (Wagin; Hamel); with slight tint of red (Kalgan Plains); faint mauve tint (Kalgan Plains, Scrub form).

*E. occidentalis*, green (Paringillup, Wickepin, Porongorups).

(3) *Stem* (Miss Flockton).

*E. occidentalis.* "Erect, terete, glabrous, herbaceous, ultimately woody; first internode 4-5 mm, long." (Lubbock.)

*E. astringens*, terete, red and covered with glands (Wagin); glandular (Hamel); terete, red, covered with minute glands, giving a spotted appearance (Kalgan Plains, 30); terete, reddish-purple, scattered glands (Kalgan Plains, 45, Scrub form); terete or slightly flattened towards top of plant, shaded red (Kalgan Plains, 45).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. occidentalis*. "First leaves linear-oblong, obtuse, petiolate, glabrous, light green, distinctly pinnatinerved." (Lubbock.)

*E. Stowardi*, petiolate, linear-lanceolate, glabrous, green.

*E. astringens*, petiolate, narrow-lanceolate, glabrous, glaucous.

*E. occidentalis*, petiolate, lanceolate, glabrous, glaucous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. Stowardi*, one, lanceolate, glabrous.

*E. astringens*, one, lanceolate, glabrous, glaucous.

*E. occidentalis*, one, lanceolate, glabrous, slightly glaucous.

(6) *Intermediate Leaves*.

*E. Stowardi*, ovate to ovate-lanceolate, acuminate, slightly undulate, petiole medium; at 6 inches (15 cm.), 5.5 cm. long, 4 cm. broad, veins scarcely prominent; at 8½ in. (21 cm.), 9 cm. long, 4.5 cm. broad, veins obscure, glaucous, young tips yellowish-green, also the flexuose stem.

*E. astringens*, broadly lanceolate to acuminate, undulate, petiole short; at 14½ in. (36 cm.), 10.5 cm. long, 5.5 cm. broad, veins prominent, midrib reddish, glaucous shading to yellowish-green, stem reddish, flexuose.

*E. occidentalis*, oblong-lanceolate to broad-ovate, shortly petiolate, veins obscure; at 24 inches, 9 cm. long, 4.5 cm. broad; at 27 in. (68 cm.), 8 cm. long, 7 cm. broad, dark green slightly tinged with white.

## (6a) (Miss Flockton).

*E. Stowardi*.

*1st leaves* linear, obtuse (Uberin).

*E. astringens*.

*1st leaves* lanceolate, glandular on edge and on the back of the midrib of the third pair, the first two pairs smooth. *Leaves* ovate-lanceolate, glands not so prominent on the edge nor midrib (Wagin).

*1st leaves* ovate-lanceolate, third pair showing glands on the edge of the leaf and midrib on the undersurface (Hamel).

*1st leaves* linear, thin, ovate, petiolate. *Leaves* alternate, broad ovate, petiolate (Kalgan Plains, 30).

*1st leaves* lanceolate to ovate-lanceolate, the green scarcely paler on the under-side, petiolate, alternate after the first three pairs (Kalgan Plains, 45, Scrub form).

*1st leaves* ovate-lanceolate. *1st alternate leaves* broadly ovate, sometimes oblique at the base, yellow midrib, self-coloured on both sides, red edges (Kalgan Plains, 45, Scrub form, second sowing).

*E. occidentalis.*

*1st leaves* very small linear or narrow lanceolate, undersurface pale green, decussate (Paringillup).

*1st leaves* ovate-lanceolate, undersurface pale green, petiolate, decussate (Wickepin).

**Series 14.—Semi-rigid, short and broad, soon alternate.***E. nutans.**E. redunca.*

*General Appearance.*—Rigid, leaves distant, lanceolate, glaucous to yellowish-green, not exceeding  $2\frac{1}{2}$  by 1 cm. at 5 in. (13 cm.).

(1) *Hypocotyl.*

*E. nutans* }  
*E. redunca* } Medium to long, filiform, pink.

(1a) *Hypocotyl* (Miss Flockton).

*E. nutans*, shaded red, puny.

*E. redunca*, terete, wiry, red (Kalgan Plains).

(2) *Cotyledons* (Petiole, taper).

*E. nutans*, V-shaped, lobes obtuse, longer than the filiform petiole, not tapering, green.

*E. redunca*, V-shaped, diverging, about as long as the petiole, tapering, glaucous.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. nutans*, green.

*E. redunca*, red (Kalgan Plains, 4); green (Kalgan Plains, B. 19).

(3) *Stem* (Miss Flockton).

*E. nutans*, shaded red.

*E. redunca*, red (Kalgan Plains, 4); terete, shaded pink (Kalgan Plains, B. 19).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. nutans*, petiolate, oblong-lanceolate, glabrous, green.

*E. redunca*, shortly petiolate, oblong-lanceolate, glaucous.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. nutans*, one, oblong-lanceolate, petiolate, glabrous, light green.

*E. redunca*, one, oblong-lanceolate, shortly petiolate, glaucous.

(6) *Intermediate Leaves.*

*E. nutans*, ovate-lanceolate, rather obtuse, petiole long, venation faint, 2 by 1.5 cm. (not fully advanced).

*E. redunca*, not seen.

## (6a) (Miss Flockton).

*E. nutans.*

*1st leaves* ovate-lanceolate. *1st alternate leaves* ovate-acute, no warty glands present.

*E. redunca.*

*1st leaves* linear, glaucous green. *1st alternate leaves* ovate, glaucous (Kalgan Plains, 4).

*1st leaves* small lanceolate, pale opaque green, alike on both sides (Kalgan Plains, B. 19).

**Series 15.—Stellate, ovate to orbicular, crenulate.**

*E. macrandra.*

*E. Lehmanni.*

*E. cornuta.*

*E. platypus.*

*General Appearance.*—Dark green, ovate to orbicular deltoid, crenulate, slightly stellate to densely stellate. The last three show affinity at this stage to the stellate, crenulate species of the Series *Corymbosæ*. The last two are densely stellate.

(1a) *Hypocotyl.*

*E. macrandra*, long, filiform, reddish.

*E. cornuta*, long, filiform, pink.

*E. Lehmanni*, long, robust, pink.

*E. platypus*, long, filiform, pink.

(1a) *Hypocotyl* (Miss Flockton).

*E. macrandra*, smooth, red (Galgallup); long, red, tapering into the root (York).

*E. cornuta*, red, slightly angular, thickening to the root (King George's Sound); terete, long and weak, red (A. Murphy); red, puny (W.A., 217).

*E. Lehmanni*, red, terete (Cape Riche); runs abruptly into the root, angular, crimson shading to green as it approaches the cotyledons (S. W. Australia); terete, smooth, shaded red (cultivated, Ballarat); red (cultivated, Lovegrove); short, red, smooth (cultivated, Sydney, A. 35); terete, red (A. 64, also X).

*E. platypus*, red, puny (Hopetoun); red (W.A.).

(2) *Cotyledons* (Petiole, taper).

*E. macrandra*, V-shaped, shorter than the filiform petiole.

*E. cornuta*, narrow-oblong reniform to almost triangular, the lobes obtuse or acute, diverging.

*E. Lehmanni*, somewhat triangular, the lobes broad, rounded at the top each with a central nerve, cleft to about the middle, shorter than the petiole, tapering into the petiole.

*E. platypus*, V-shaped, longer than the petiole, slightly tapering.

(2a) *Cotyledons* (Undersurface, Miss Flockton).

*E. macrandra*, purple tint (Galgallup).

*E. cornuta*, red or green (King George's Sound); green (A. Murphy, also Yate, 217).

*E. Lehmanni*, slightly tinged with purple (Cape Riche); green, with faint purple tint on the venation (S. W. Australia); green (cultivated, Ballarat, also Lovegrove, Manly and Clarence Siding); usually green, but sometimes red (cultivated, Manly); a deep purple red (puce) (cultivated, Mount Lindsay).

(3) *Stem* (Miss Flockton).

*E. macrandra*, tinted red, some glands on the upper part (Galgallup); red, with warty glands (York).

*E. cornuta*, terete, smooth, a few glands not prominent, red a little way up (King George's Sound); terete, glands, red (W.A., Murphy); tinted red (W.A., 217).

*E. Lehmanni*, reddish, covered with stellate hairs (Cape Riche); green, shaded red, stellate hairs (cultivated, Ballarat); green, covered with stellate hairs (cultivated, Lovegrove); stellate glands, also on the very short epicotyl and young growth (cultivated, Manly); terete, thickly covered with stellate glands (cultivated, Clarence Siding); terete, with prominent warty glands (cultivated, Mount Warning); crimson a little way up (cultivated, National Park).

*E. platypus*, undersurface pale green and having warty glands (Hopetoun); shaded pink, having warty glands above the cotyledons (W.A.).

(4) *1st Pair of Leaves* (Petiole, shape, vestiture).

*E. macrandra*, petiolate, oblong-lanceolate, glabrous, green.

*E. cornuta*, petiolate, petiole long, ovate, glabrous, green.

*E. Lehmanni*, petiolate, oblong, stellate, green.

*E. platypus*, petiolate, narrow-lanceolate to ovate, stellate, green.

(5) *Subsequent Pairs of Leaves* (Number, shape, vestiture).

*E. macrandra*, none.

*E. cornuta*, two, oblong to broad ovate, glabrous.

*E. Lehmanni*, one, ovate, stellate.

*E. platypus*, two, ovate, stellate.

(6) *Intermediate Leaves.*

*E. macrandra*, ovate, undulate, and somewhat crenulate, veins somewhat prominent, 5 cm. long, 3 cm. broad, dark green, tips yellowish-green.

*E. cornuta*, ovate to orbicular, emarginate or apiculate, undulate, veins prominent, petiole long; at 18 in. (45 cm.), 5.5 cm. long, 5 cm. broad, light green.

*E. Lehmanni*, ovate-lanceolate to orbicular, with a minute mucro; at 7½ in. (19 cm.), 4 cm. long, 4.5 cm. broad; at 13 in. (33 cm.), 4.5 cm. long, 3 cm. broad, dark green, shaded glaucous; at 22 in. (55 cm.), obliquely lanceolate, obtuse except for a minute mucro, triplinerved, dark green, 6 cm. long, 5 cm. broad.

*E. platypus*, ovate to ovate-lanceolate, slightly undulate, paler on the under-surface, subglaucous above, venation distinct (immature).

(6a) (Miss Flockton).

*E. macrandra.*

*1st leaves* ovate and ovate undulate, undersurface green. *1st alternate leaves* ovate-undulate, inclined to be trinerved, midrib red (Galgalup).

*1st leaves* lanceolate, generally alternate after the first pair. *1st alternate leaves* lanceolate and sometimes ovate (York)

*E. cornuta.*

*1st leaves* ovate, glabrous, undersurface pale green. *1st alternate leaves* cordate or broadly ovate, undersurface paler green, entirely glabrous (King George's Sound).

*1st leaves* narrow, small, petiolate (A. Murphy).

*1st leaves*, first pair linear, afterwards ovate or ovate-lanceolate. *1st alternate leaves* ovate-orbicular; a few prominent oil glands. Blue green, hardly glaucous, hardly paler on the undersurface. A few prominent oil dots, hardly tubercles. Red stems (W.A., 217).

*E. Lehmanni.*

*1st leaves* undersurface slightly tinged with purple. *Leaves* covered in stellate glands on undersurface, midrib and at intervals along the margin (Cape Riche).

*1st leaves* ovate obtuse, with transparent stellate, glandular hairs. *1st alternate leaves* ovate, covered with stellate hairs, alternate after the first or second pairs. The leaves are not obcordate as in some others (S. W. Australia).

*1st leaves* ovate, with stellate hairs, undersurface pale green (cultivated, Ballarat).

*1st leaves* obcordate with scattered stellated hairs. *1st alternate leaves* orbicular retuse, scattered stellate hairs (cultivated, Lovegrove).

*1st leaves* ovate, with scattered glands on both sides. *1st alternate leaves* broadly ovate, almost orbicular, with stellate glands on both sides (cultivated, Manly).



*1st leaves* ovate, sometimes emarginate, covered on both sides with stellate glands (cultivated, Clarence Siding).

*1st alternate leaves* broad, almost orbicular and ovate, two rather prominent outer nerves (cultivated, Mount Warning).

*1st leaves* ovate and rough with warty glands. *1st alternate leaves* ovate or ovate-lanceolate, warty glands. The protuberant glands are still present for six leaves up the stem (cultivated, National Park).

*E. platypus.*

*1st leaves* ovate, some almost orbicular. *1st alternate leaves* the same, larger, and all covered with warty glands (Hopetoun).

*1st leaves*, first pair linear or lanceolate. *1st alternate leaves* ovate-acute. This plant has no warty glands on the leaves (W.A.).

## Acknowledgments.

I have already referred to the way in which this work has been written—records of facts have been made simultaneously with an appeal for additional facts, in other words, the whole of the facts submitted were not available when publication began.

First of all, the help that I have received from Miss Margaret Flockton, the artist of this work, is immense, and it speaks for itself. She is practically a joint author. Her drawings are alike beautiful and artistic, and the botanist will appreciate them because of their fidelity to nature. As knowledge progressed, and perhaps long after a loan specimen had been returned to its owner, the faithfulness of the drawing sometimes brought out a hitherto unsuspected point. I have reproduced specimens of the fine series of coloured drawings of seedlings at different stages, on which she has been engaged for over twenty years, and the work of Miss Ethel King and Miss Phyllis Clarke on the same series, though very much less in extent, is worthy of the greatest praise.

Mr. William Faris Blakely, in addition to his other duties, has been my assistant for *Eucalyptus* since 1913, and has given me increasing help since that date, so that he has been quite indispensable to me. In return, I have instructed him in the subject to the best of my ability. Without for a moment presuming to dictate his future course of action, I hand over the unrivalled *Eucalyptus* collection of the National Herbarium to him, in a special sense, for he is acquainted with it as no one else is, and he is entirely competent. I am confident that he will successfully add to, in his own way, the *Eucalyptus* work carried on by me at the National Herbarium for nearly thirty years, and at the Technological Museum for ten years before that.

I never forget the early pioneering work that my old colleague, Mr. Henry Deane, M.A., and I undertook in the eighties and nineties, and some of this work is commemorated by species and varieties which bear our joint names.

I do not think that a single Part has been published which does not show my indebtedness to Mr. R. H. Cambage. No botanist has helped me so much as he, not only with critical specimens and valuable notes, but many observations are the result of consultations at various times with this valued colleague, whose knowledge of the genus is profound. This can be seen in part from the quotations I have so freely made from his works. It would be simply impossible to fully state my indebtedness to him. A bibliography of his *Eucalyptus* work will be found in another place.

I most gratefully do acknowledge the assistance of Dr. T. L. Bancroft, of Eidsvold, Queensland, who has supplied me for many years with herbarium specimens, heavy axe-cuts of bark and timber, photographs or negatives or both, and valuable notes—all illustrative and to the point. No man could have a more responsible and unselfish correspondent than he, who is well known to zoologists and physiologists also as one who delights in supplying material to facilitate the studies of others, even if they interrupt his own.

Professor J. B. Cleland has been a similarly unselfish collector of the same type, and it is a great pleasure to acknowledge his kind assistance.

For specimens and notes which have enabled me to clear up many points in regard to Northern Territory species, I am indebted to Dr. H. I. Jensen, Messrs. Charles Ernest Frederick Allen and Gerald Freer Hill. These gentlemen have travelled great distances over difficult country and have always been patient in replying to my inquiries. Dr. Jensen's work on the geological formations on which various *Eucalypts* are found is largely of a pioneering character, and will be found to be freely quoted in Part LXVII.

From the Forestry authorities, particularly of Western Australia and my own State, I received active support. As regards the former State, Australian forestry and botany both deplored the transfer of Mr. C. E. Lane-Poole, the Conservator of Forests, who, recognising the fact that sound forestry practice cannot exist without a sound knowledge of the taxonomy, morphology and ecology of *Eucalyptus*, helped

me with notes, photographs and adequate specimens. In the same public spirit I have been helped by his successor, Mr. Stephen L. Kessell, and his botanical collector, Mr. Charles Austin Gardner, who, by the judicious collection of specimens and valuable field-notes concerning Western Australian species in general, has valuably supplemented the researches in tropical Western Australia of Mr. W. V. Fitzgerald, and enabled one to co-ordinate the work of collectors in the Northern Territory and tropical Queensland. Mr. W. C. Grasby, friend of everybody who desires to study the plants of Western Australia, has provided many specimens and notes, and his name often occurs in these pages.

In South Australia, Mr. Walter Gill, Conservator of Forests of that State, has helped me for at least thirty years. In Victoria I have had some assistance from Mr. A. D. Hardy, of the Forestry Department. The co-operation of Mr. R. D. Hay, Chairman of the Forestry Commission of my own State, and a fellow-worker for many years, has been cordial all along. The specimens sent by each Forester have been referred to under each species concerned; the work of Mr. W. A. W. de Beuzeville has been especially noteworthy.

The Government Botanists of the various States have all been most kind in presenting and lending specimens, and in supplying information. As regards Melbourne, I mention the late Mr. J. G. Luehmann Professor Ewart and his successor, Mr. W. Laidlaw. In Adelaide, Mr. J. M. Black, although occupying no official position, does much public botanical work at his own expense, while Mr. L. Rodway, the honorary Government Botanist of Tasmania, could not have been more helpful if he had been endowed with adequate public funds. Last, but not least, let me acknowledge the great help I have received from Mr. C. T. White, of Brisbane, who succeeded his grandfather, Mr. F. M. Bailey, in the office of Government Botanist. In return for their kindness, I can only hope that what I have written may be of assistance to my colleagues in the compilation of the Floras of their respective States.

The sowing of seeds, and the welfare of the seedlings have necessitated the greatest care, extending over a long period of years. Sometimes an individual plant has had to be kept in the same pot under observation for over seven years. I am greatly indebted to Gardeners Sydney Smith, Ralph Tate, and Charles Woolnough, while the general supervision of Mr. E. N. Ward, the Superintendent and now Curator of the Sydney Botanic Gardens, has been much more than nominal.

To successive Librarians of the Botanic Gardens, viz., the late Miss Amelia Maud Jenner, who died on 23rd February, 1918 (Parts VI to XXXIV), Miss R. M. Breeding (now Mrs. McKinnon) (Parts XXXV to XLIX), and Miss M. Merrick (Part L to end), I am indebted more than I can express. These ladies have helped me by hunting up references, by typing confused (sometimes very confused) manuscript, and reading the proofs. To Mr. Keith E. Rogers I am indebted for the reading of proofs of some Parts, and to Mr. Robert H. Anderson of others, and to the latter I am indebted for useful compilation work that I have elsewhere acknowledged.

My own daughter, Miss Acacia Dorothy Maiden, B.A., has often rendered useful service by undertaking translations into and from the Latin, to save me time.

As a rule I have acknowledged the help I have got from my friends, when speaking of their specimens, and hundreds of names will be found to be quoted in this way. If I have omitted any names I ought to have inserted, I shall be very sorry.

## EXPLANATION OF COLOURED PLATES.

## COLOURED PLATE 9.

*E. odorata* Behr and Schlecht.

88. (Ref. No. B 47.) Monarto, South Australia (Dr. J. B. Cleland, July, 1909). A seedling  $3\frac{1}{2}$  inches high with the small cotyledons still attached and with four pairs of opposite, petiolate, lanceolate leaves and three pairs of alternate leaves above them. Sown 29th December, 1914; drawn 15th March, 1915.

89. Upper portion of No. 88, at 4 inches high, showing the somewhat obtuse lanceolate, venulose leaves, Drawn 15th May, 1915.

*E. populifolia* Hook f.

90. (Ref. No. D 3.) Pilliga Bore (J. L. Boorman). A seedling 3 inches high, showing the elongated hypocotyl and three pairs of linear-lanceolate, opposite leaves, also some broad alternate leaves above them. Sown 25th October, 1915; drawn 17th December, 1916.

91. (Ref. No. C.) Coolabah (J. L. Boorman, January, 1902). Showing the upper portion of a seedling 8 inches high with six lanceolate, venulose leaves. Its affinity to No. 88, *E. odorata*, is apparent. Sown 6th June, 1905; drawn 30th January, 1906.

*E. albens* Miq.

92. (Ref. No. 4.) Coonabarabran (J. L. Boorman, October, 1916). A very young seedling showing the filiform hypocotyl, the bilobed cotyledons, and the first pair of leaves. Sown 26th November, 1917; drawn 4th January, 1918.

93. The same plant a little more advanced. Drawn 13th March, 1918.

94. Another plant of the same sowing as No. 92, about 2 inches high, with the cotyledons still attached and with three pairs of opposite leaves, the upper pair being very broad and veiny. Drawn 13th March, 1918.

95. (Ref. No. C 30.) Mumbil (J. L. Boorman, 1909). Upper portion of a 5-inch seedling, showing the slightly flexuose stem and the broad lanceolate, glaucous leaves. Sown 5th January, 1915; drawn 14th April, 1915.

*E. siderophloia* Benth.

96. (Ref. No. 6011.) Rookwood (J. L. Boorman, 6th December, 1917). A very young seedling  $1\frac{1}{2}$  inches high, showing the long, slender hypocotyl, the rather large bilobed cotyledons and two pairs of rather broad-lanceolate leaves. Sown 11th December, 1917; drawn 23rd January, 1918.

97. The same plant at 5 inches, showing considerable variation in the opposite leaves. Drawn 19th June, 1918.

*E. leucorylon* F. v. M.

98. Mount Lofty, South Australia (Max Koch, 1902). A seedling 3 inches high showing the long hypocotyl, the small cotyledons, and three pairs of opposite, lanceolate, glaucous leaves. The internodes are also slightly glandular. Sown 5th February, 1904; drawn 29th March, 1904.

99. A pair of opposite leaves from the same plant four months later, showing the sessile character and the glaucousness. Drawn 5th July, 1905.

*E. paniculata* Sm.

- 100a. (Ref. No. 4070). North Head, Ulladulla, N.S.W. (R. H. Cambage, December, 1911). A very young seedling, showing the slender hypocotyl, the cotyledons, and three pairs of opposite leaves. Sown 15th December, 1917; drawn 15th January, 1918.
100. The same plant nearly 3 inches high, showing the cotyledons and five pairs of opposite leaves, the three lowest pair being considerably smaller than the upper pairs. Drawn 19th March, 1918.
101. Showing two alternate leaves of the same plant at 24 inches high. They are intermediate leaves and are broader than the typical adult leaves. Drawn 28th April, 1920.

## PLATE 10.

*E. Stuartiana* F.v.M.

102. (Ref. No. C 57). Mudgee district, N.S.W. (A. Murphy, 1915). A seedling 4 inches high, showing the slender hypocotyl, the rather large, bilobed cotyledons, and seven pairs of opposite leaves. The three lower pairs are much narrower than the three upper pairs. Sown 13th October, 1915; drawn 12th January, 1916.
103. (Same particulars as above). The upper portion of 102 which has reached the alternate leaved stage. It will be noted that the leaves are no longer petiolate, but are closely sessile and are all broadly ovate-cordate, while the stem is rough with minute oil-dots. Drawn January, 1917.

*E. cinerea* F.v.M.

- 104a. (Ref. No. X 2). Wingello, N.S.W. (A. Murphy, 15th January, 1918). Two very young seedlings showing the thread-like hypocotyl and the bilobed cotyledons. Sown 22nd January, 1918; drawn 8th February, 1918.
104. Represents the larger of the above seedlings, which has now grown to a height of 3 inches, with the cotyledons still attached, and showing one pair of narrow leaves and three pairs of broad leaves. Drawn 22nd March, 1918.
105. A pair of opposite, sessile leaves of 104 at 9½ inches from the ground, the total height being 21 inches. Drawn 2nd December, 1918.
106. A pair of opposite leaves of the same plant at 24 inches high. It will be seen that they are slightly smaller than those of No. 105. Drawn 7th May, 1919.

*E. pulverulenta* Sims.

- 107, 107a. Cox River, N.S.W. (J. H. Maiden and R. H. Cambage, October, 1900). Young seedlings showing the long hypocotyl and the bilobed cotyledons. Sown 6th June, 1905; drawn 26th June, 1905.
108. Same particulars as above. A seedling 2½ inches high showing the cotyledons and four pairs of opposite, very shortly petiolate, leaves. Drawn 15th September, 1905.
109. Upper portion of No. 108, showing eight pairs of sessile, opposite leaves and the glaucous character. Drawn 3rd March, 1906.

*E. rubida* Deane and Maiden.

110. (Ref. No. X 87.) Hargraves, N.S.W. (A. Murphy, 15th January, 1918). A seedling  $1\frac{1}{2}$  inches high, showing the very small cotyledons and two pairs of narrow, petiolate leaves. Sown 22nd January, 1918; drawn 15th March, 1918.
111. Upper portion of No. 110 at 7 inches high, showing three pairs of broad, sessile leaves. Drawn 15th May, 1918.

At 19 inches high the same plant was unchanged as regards the shape of the leaves, but the colour was more glaucous. When last seen at 27 inches high it was still unchanged, and the leaves were opposite.

*E. elaeophora* F.v.M.

112. (Ref. No. 133.) Mt. Esk, Bowan Park, N.S.W. (W. F. Blakely, September, 1906). A seedling showing the thread-like hypocotyl, the bilobed cotyledons, and two pairs of very narrow opposite leaves. Sown 12th December, 1917; drawn 13th February, 1918.
- 112a. A seedling from the same sowing as No. 112 which has lost its cotyledons, and which shows the narrow first pair of leaves and two broader pairs of leaves above them.
113. Same particulars as No. 112. Upper portion of No. 112 at 18 inches high, showing the opposite, sessile nature of the leaves and the long internodes. Drawn 3rd December, 1918.
114. (Ref. No. X 26.) Mandurang, near Bendigo, Victoria (J. Blackburn, 18th July, 1908). A seedling 5 inches high, showing the very narrow first and second pairs of leaves and five rather broad subsequent pairs. In every respect it agrees with 112 throughout the various stages of development. Sown 12th December, 1917; drawn 26th March, 1918.

*E. Gunnii* Hook.

115. (Ref. No. X 58.) Near Lake St. Clair, Tasmania (L. Rodway, December, 1917). A seedling showing the long hypocotyl, the small bilobed cotyledons and the first four pairs of leaves. Sown 17th January, 1918; drawn 22nd March, 1918.
116. Same particulars as 115. Upper portion of No. 115, showing the sessile, lanceolate, opposite leaves. Drawn 22nd May, 1918.
117. Upper portion of No. 116 at 10 inches high, showing the stem-clasping nature of the leaves. Drawn 21st October, 1918.

## PLATE 11.

*E. cneorifolia* DC.

118. (Ref. No. C 2.) Kingscote, Kangaroo Island, South Australia (J.H.M., January, 1907). Seedling with one pair of cotyledon leaves and four pairs of opposite, narrow, first leaves. Sown 4th January, 1915; drawn 8th January, 1915.
119. Same particulars as No. 118. Seedling, not showing ground line, drawn 10th April, 1915. Ground line not shown, nor the first pair of leaves as in No. 118. The second pair are still opposite and enlarged; the remainder of the leaves are also enlarged and alternate.

*E. salmonophloia* F.v.M.

120. (Ref. No. B 65.) 70 miles north of Kurrawang, Western Australia (W. V. Fitzgerald). Seedling with pair of cotyledon leaves and six pairs of opposite first leaves. The first two pairs are linear, the second pair being much elongated; the other pairs are much shorter and lanceolate.
121. Same particulars as No. 120. Upper portion of the same seedling, drawn 16th September, 1915. The lowest and highest pair of leaves depicted are strictly opposite; six leaves intermediate between these are alternate, or perhaps in some cases an opposite leaf may have fallen off. Drawn 16th September, 1915.

The topmost portion of this seedling was drawn 1st May, 1919, when it had attained the height of 3 feet 2 inches. All the leaves had fallen off except four alternate ones at the top. They are 8 or 9 cm. long, 1.5 cm. broad, with petioles of 1 cm.

*E. salubris* F.v.M.

122. (Ref. No. X 114.) Western Australia, without definite locality (Andrew Murphy, 15th January, 1918). Seedling with one pair of cotyledon leaves and two pairs of opposite first leaves. The lower pair are very narrow, and the second pair narrow-lanceolate. Sown 22nd January, 1918; drawn 27th March, 1918.
123. Same particulars as No. 122. Seedling with cotyledon leaves dropped off, and five pairs of leaves, the lowest four opposite and the top pair beginning to be alternate. The two lowest pairs retarded in growth, the three topmost in vigorous growth, and all petiolate and lanceolate. Drawn 20th June, 1918.

*E. transcontinentalis* Maiden.

124. (Ref. No. A 97.) Coolabah, Western New South Wales (J. L. Boorman, 1901). Seedling, with pair of cotyledon leaves and four pairs of opposite leaves; the two lower pairs almost linear, the two upper pairs shorter and broader. Sown 23rd November, 1914; drawn 25th February, 1915.
125. Same particulars as No. 124. Seedling without cotyledon leaves, hypocotyl, etc. Seven pairs of first leaves, all opposite and sessile; the lowest pair very narrow, almost linear, the rest of the leaves becoming broader as the top of the seedling is reached, and becoming broader at the base so as to be almost stem-clasping. They are almost decurrent.
126. Same particulars as No. 124. Upper portion of seedling 9 inches in height when drawn on 18th May, 1915. The leaves are beginning to be alternate and more erect.

*E. gracilis* F.v.M.

127. (Ref. No. B 100.) Southern Cross, Western Australia (J.H.M., October, 1909). One pair of cotyledon leaves. Sown 4th January, 1915; drawn 16th March, 1915.
128. Same particulars as No. 127. Seedling with cotyledon leaves and dense growth of leaves (and some axillary branches), all linear and opposite.
129. Same particulars as Nos. 127 and 128. Seedling, upper part, showing alternate, subsessile, short lanceolate leaves. Drawn 7th April, 1916.

*E. oleosa* F.v.M.

130. (Ref. No. X 12.) Minnipa, Eyre's Peninsula, South Australia (W. J. Spafford, August, 1916). Seedling with one pair of cotyledon leaves and a large number of linear leaves (becoming broader towards the top; nearly all opposite or in whorls of three). Some of the apparently alternate leaves may probably be attributed to leaves having fallen off.
131. Same particulars as No. 130. Top of a seedling 8 inches high. Leaves all alternated, channelled, rather narrow, tending to become appressed to the stem. Drawn 28th August, 1918.
132. Same particulars as No. 130. Top of seedling 18 inches high. Leaves sub-sessile, acuminate, alternate, ovate-lanceolate, somewhat appressed to the stem. Drawn 28th February, 1919.

## PLATE 12.

*E. Flocktoniae* Maiden.

133. (Ref. No. C 24.) Desmond, Western Australia (a railway station 26 miles north of Hopetoun on the south coast) (J.H.M., October, 1909). Seedling with two cotyledon leaves and a number of almost linear leaves; all shown not opposite except the two top pairs, but this not-opposite appearance is apparently owing to some leaves having fallen off. (I have, however, a drawing in which this not-opposite appearance is exhibited in an even younger seedling.) Further sowings might be made. Sown 18th September, 1913; drawn early in January, 1914.
134. Same particulars as No. 133. Top of a seedling 18 cm. high. What is drawn shows a tendency to axillary branches; but the lower portion (not drawn) shows a much greater tendency to branch, a pair of branches being in the axils of the first pair of first leaves, and occurring in each of the seven pairs of first leaves (not drawn). One of the branches was 5 cm. long. Drawn 19th January, 1914.
135. Same particulars as No. 133. Two portions of a seedling 1 foot 5 inches high, drawn 12th November, 1914. This seedling shows that the decurrence of the leaves is exhibited early in the life of the plant. (For further particulars and discussion see Part XXXIX, p. 281.) The rachis is quadrangular, as conspicuously shown in *E. globulus* and other species. It has a rather thick leaf, with the intramarginal vein near to the edge. Both sides are similar in colour.

I have a series of drawings of what I believe to be *E. Flocktoniae* which are more glaucous than those already referred to. The leaves are even more decurrent, and in every essential character the seedlings resemble Nos. 133-5. The seeds were received from the Woods and Forests Department of Western Australia, without precise locality, in 1903, labelled *E. salmonophloia* by mistake, and sown 6th June, 1905. The drawings commenced on 11th July, 1905. It is impossible to say how a slip of this kind occurred, but the result brought to light a remarkable seedling.

*E. leptophylla* F.v.M.

136. (Ref. No. 102 H.H. 143.) West side of Ballandry, near Griffith, N.S.W. (W. D. Campbell). Seedling with one pair of cotyledon leaves and two pairs of opposite linear first leaves. Sown 20th October, 1919; drawn 16th December, 1919.
- Seedling unchanged 23rd March, 1920.
137. Same particulars as No. 136. Seedling, 5½ inches high, ground line not shown, with nine pairs of opposite, narrow-lanceolate, sub-sessile leaves. Drawn 14th April, 1920.
- On 1st November, 1920, was still 10½ inches high, branching, but otherwise unchanged.



138. Same particulars as No. 136. Seedling,  $8\frac{1}{2}$  inches high; top of seedling drawn 11th October, 1920. Five pairs of opposite, sub-sessile, narrow oblong-lanceolate leaves. Drawn 11th October, 1920.

On 1st November, 1920, this seedling was  $10\frac{1}{2}$  inches high, and some of the leaves oblong-ovate.

On 31st January, 1921, this seedling was 15 inches high, and unchanged except some branching.

On 24th May, 1921, this seedling was  $23\frac{1}{2}$  inches high, leaves alternate, but otherwise practically unchanged.

139. Same particulars as No. 136. Top of seedling, which was  $10\frac{1}{2}$  inches high, drawn 11th October, 1920. A second seedling of the same sowing. Four pairs of leaves nearly opposite, sub-sessile, elongated narrow-lanceolate, exhibiting a tendency to branching in the axils.

On 31st January, 1921, seedling was  $13\frac{1}{2}$  inches high, branching on the top.

On 8th March, 1921, was 16 inches high, the leaves glaucous and almost opposite.

On 24th May, 1921, the seedling was 17 inches high, the leaves alternate, but otherwise unchanged.

*E. calycogona* Turcz.

140. (Ref. No. 8.) Eyre's Peninsula, South Australia, where it is locally known as "Kong Mallee." (W. J. Spafford). Seedling, showing one pair of cotyledon leaves and five pairs of first leaves opposite, shortly petiolate and oblong-lanceolate (small), not channelled. Sown 26th March 1918; drawn 5th July, 1918.

The top  $6\frac{1}{2}$  inches of the same seedling drawn on the 7th April, 1919, and provisionally numbered 141, but was crowded out. Height 10 inches. All the leaves were shortly petiolate, alternate, ovate-lanceolate, and showed a tendency to branch.

142. (Ref. No. X 3). Yeelanna and Butler, Eyre's Peninsula, South Australia (W. J. Spafford, June, 1917). Seedling, with cotyledon leaves and four pairs of young, opposite, shortly petiolate, lanceolate leaves. Sown 13th December, 1917; drawn 21st March, 1918.

143. Same particulars as No. 142. Seedling with three cotyledon leaves (rare), succeeded by five whorls of triphyllous leaves (rarer), still young. Drawn 22nd March, 1918.

Another seedling of the same batch, drawn the same date, had lost its cotyledon leaves, but exhibited no trace of triphyly in the first leaves.

144. Same particulars as No. 142. Seedling 18 cm. high, cotyledon leaves dropped. The first two pairs of seedling leaves narrow, the third pair broader, tending towards lanceolate and just becoming non-opposite. All the other leaves ovate-lanceolate and alternate. All the leaves, whatever the shape, with short petioles. Drawn 16th May, 1918.

145. Same particulars as No. 142. Seedling 2 feet  $3\frac{1}{2}$  inches high, the top 4 inches, say 1 dm., drawn. The leaves all alternate, distinctly petiolate and mostly ovate-lanceolate in shape. Drawn 27th February, 1919.

On 23rd December, 1919, the leaves were unchanged, but the seedling had attained a height of 2 feet 8 inches. The leaves of the two stages referred to under No. 145 display a very strong similarity to those of the younger seedling, 141, which has been already referred to as crowded out.

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales" \* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets :—

- |   |  |
|---|--|
| <i>acacioides</i> A. Cunn. (xlviii).                        | <i>melliodora</i> A. Cunn. (ix).                 |
| <i>acmenioides</i> Schauer (xxxii).                         | <i>microcorys</i> F.v.M. (xxxviii).              |
| <i>affinis</i> Deane and Maiden (lvi).                      | <i>microtheca</i> F.v.M. (lii).                  |
| <i>amygdalina</i> Labill. (xvi).                            | <i>Muelleriana</i> Howitt (xxx).                 |
| <i>Andrewsi</i> Maiden (xxi).                               | <i>numerosa</i> Maiden (xvii).                   |
| <i>Baileyana</i> F.v.M. (xxxv).                             | <i>obliqua</i> L'Hérit. (xxii).                  |
| <i>Bakeri</i> Maiden (lxx).                                 | <i>ochrophloia</i> F.v.M. (l).                   |
| <i>Baueriana</i> Schauer (lvii).                            | <i>odorata</i> Behr and Schlechtendal (xli).     |
| <i>Baueriana</i> Schauer var. <i>conica</i> Maiden (lviii). | <i>oleosa</i> F.v.M. (lx).                       |
| <i>Behriana</i> F.v.M. (xli).                               | <i>paniculata</i> Sm. (viii).                    |
| <i>bicolor</i> A. Cunn. (xliv).                             | <i>pilularis</i> Sm. (xxxi).                     |
| <i>Boormani</i> Deane and Maiden (xlv).                     | <i>piperita</i> Sm. (xxxiii).                    |
| <i>Bosistoana</i> F.v.M. (xliii).                           | <i>Planchoniana</i> F.v.M. (xxiv).               |
| <i>Caleyi</i> Maiden (lv).                                  | <i>polyanthemus</i> Schauer (lix).               |
| <i>capitellata</i> Sm. (xxviii).                            | <i>populifolia</i> Hook. (xlvii).                |
| <i>conica</i> Deane and Maiden (lviii).                     | <i>propinqua</i> Deane and Maiden (lxi).         |
| <i>Consideniana</i> Maiden (xxxvi).                         | <i>punctata</i> DC. (x).                         |
| <i>coriacea</i> A. Cunn. (xv).                              | <i>radiata</i> Sieb. as <i>amygdalina</i> (xvi). |
| <i>corymbosa</i> Sm. (xii).                                 | <i>regnans</i> F.v.M. (xviii).                   |
| <i>crebra</i> F.v.M. (liii).                                | <i>resinifera</i> Sm. (iii).                     |
| <i>Dalrympleana</i> Maiden (lxiv).                          | <i>robusta</i> Sm. (lxviii).                     |
| <i>dives</i> Schauer (xix).                                 | <i>rostrata</i> Schlecht. (lxii).                |
| <i>dumosa</i> A. Cunn. (lxv).                               | <i>rubida</i> Deane and Maiden (xliii).          |
| <i>eugeniioides</i> Sieber (xxix).                          | <i>saligna</i> Sm. (iv).                         |
| <i>fruticetorum</i> F.v.M. (xlii).                          | <i>siderophloia</i> Benth. (xxxix).              |
| <i>gigantea</i> Hook. f. (li).                              | <i>sideroxylon</i> A. Cunn. (xiii).              |
| <i>globulus</i> Labill. (lxvii).                            | <i>Sieberiana</i> F.v.M. (xxxiv).                |
| <i>goniocalyx</i> F.v.M. (vi).                              | <i>Smithii</i> R. T. Baker (lxx).                |
| <i>hemastoma</i> Sm. (xxxvii).                              | <i>stellulata</i> Sieb. (xiv).                   |
| <i>hemiphloia</i> F.v.M. (vi).                              | <i>tereticornis</i> Sm. (xi).                    |
| <i>longifolia</i> Link and Otto (ii).                       | <i>tessellaris</i> F.v.M. (lxvi).                |
| <i>Luehmanniana</i> F.v.M. (xxvi).                          | <i>Thozetiana</i> F.v.M. (xlix).                 |
| <i>macrorrhyncha</i> F.v.M. (xxvii).                        | <i>viminalis</i> Labill. (lxiv).                 |
| <i>maculata</i> Hook. (vii).                                | <i>virgata</i> Sieb. (xxv).                      |
| <i>Maideni</i> F.v.M. (lxix).                               | <i>vitrea</i> R. T. Baker (xxiii).               |
| <i>melanophloia</i> F.v.M. (liv).                           |  |

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\* Government Printer, Sydney. 4to. Each part contains 4 plates and other illustrations.

NOTE BY GOVERNMENT PRINTER.

Financial conditions have so largely affected publications that it is no longer possible to continue the issue of "The Forest Flora of New South Wales" at the old rates, and from this date onward, i.e., from and including Part 7, Vol. VII, the price of the individual Parts will be raised to 2s. 6d. each.

For those Parts already published the old sale price will be adhered to, and subscriptions already received will not be disturbed, but the new subscription rate of 2s. 6d. per part, or 25s. for 12 parts, will come into effect as from the 1st July, 1921.

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Sydney: Alfred James Kent, I.S.O., Government Printer—1931.

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385. *E. conglomerata* Maiden and Blakely, n.sp.
386. *E. tropica* Cabbage.
387. *E. pseudo-piperita* Maiden and Blakely, n.sp.
388. *E. urceolaris* Maiden and Blakely, n.sp.
389. *E. Callanii* Blakely.
390. *E. pachycalyx* Maiden and Blakely, n.sp.
391. *E. subviridis* Maiden and Blakely, n.sp.
392. x *E. McClatchie* Kinney.
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98. *E. globulus* Labill.
- Var. *compacta* Maiden, n. var.
395. *E. bicostata* Maiden, Blakely and Simmonds, n.sp.
396. *E. St. Johni* R. T. Baker.
298. x *E. pseudo-globulus* (Hort.), Naudin.
397. *E. paradoxa* Maiden and Blakely, n.sp.
398. *E. oviformis* Maiden and Blakely, n.sp.
399. *E. niphophila* Maiden and Blakely, n.sp.
400. *E. congener* Maiden and Blakely, n.sp.
401. *E. nubilis* Maiden and Blakely, n.sp.
402. *E. Grasbyi* Maiden and Blakely, n.sp.
403. *E. Kochii* Maiden and Blakely, n.sp.
404. *E. platycorys* Maiden and Blakely, n.sp.
405. *E. Kingsmilli* Maiden and Blakely, n.sp.
406. *E. scyphocalyx* (F.v.M.) Maiden and Blakely, n.sp.
407. *E. Helmsii* Maiden and Blakely, n.sp.
408. *E. concinna* Maiden and Blakely, n.sp.
409. *E. ochrophylla* Maiden and Blakely, n.sp.
410. *E. Nicholi* Maiden and Blakely, n.sp.
411. x *E. Crawfordi* Maiden and Blakely, n.sp.
412. *E. glaucescens* Maiden and Blakely, n.sp.
413. *E. Archeri* Maiden and Blakely, n.sp.
414. *E. subcrenulata* Maiden and Blakely, n.sp.
415. *E. Tindalae* Blakely, n.sp.
416. *E. Wilkinsoniana* R. T. Baker.
417. *E. nigra* R. T. Baker.

Plates, 288-291. (Issued February, 1929.)

## PART LXXII.

285. *E. rariflora* Bailey.
418. *E. polycarpa* F.v.M.
419. x *Langii* Maiden and Blakely, n.sp.
420. *E. pygmaea* Blakely.
421. *E. deformis* Blakely.
422. *E. aequans* Blakely.
423. *E. globoidea* Blakely.
424. *E. Bottii* Blakely.
425. *E. Robertsoni* Blakely.
426. *E. multicaulis* Blakely.
427. *E. Bleeseri* Blakely.
428. *E. Dielsii* Gardner.
429. *E. Gilleni* Ewart and L. R. Kerr.
137. *E. alba* Reinwardt.
430. *E. platyphylla* F.v.M.
431. *E. pastoralis* Spencer Moore.
432. *E. tectifera* F.v.M.

Notes on Supposed Hybrids.

### The Curving Boundary and Allied Matters—

1. A Botanical or Forest Survey.
2. Each State must work out its Botanical Survey.
3. The *E. albens* line.
- 3A. The Sydney enclave.
4. The relation between wheat-growing and rainfall, particularly as regards—
  - (a) New South Wales (compared with *E. albens* line).
  - (b) Goyder's Line of South Australia.

Plates 292-295. (Issued November, 1929.)

## PART LXXIII.

### Seedlings.

1. Historical.
2. Their Horticultural Value.
3. Value of a Knowledge of Seedlings to the Forester, Nurseryman, and Gardener.
4. Drawings and their Schedules.
5. Notes on the Descriptions—
  - a. Oil-glands.
  - b. Hairs.
  - c. Tubercular Growths.
  - d. Colour.
  - e. Glaucescence.
  - f. Measurements.
6. Notes on the Embryo—
  - a. Historical.
  - b. Poly- (tri-) cotyly.
  - c. Cohesion.
  - d. Margin.
  - e. Venation.

Detailed Descriptions of Seedlings.

### Supplementary Notes—

- Rate of Growth—
- Growth and Age of Trees.
- Natural Afforestation.
- Flowering in Dwarf State.
- Liquids in Tree Trunks.
- Pandulous Branches.
- Manna.
- Kino.
- Size and Habit.
- Barks.
- Timbers.
- Leaves (and Oils.)
- Inflorescence.
- Fruits.
- Adjustment of Botanical Descriptions.
- Additional Bibliographical Notes.
- Coloured Plates 1-4. (Issued November, 1929.)

## PART LXXIV.

### Seedlings—continued.

#### Division Reniformæ.

#### Section 2.—Medium Cotyledons.

- Series 2a.—Corymbosæ—Peltatæ.
- Series 2b.—Corymbosæ—Non-peltatæ.
- Series 2c.—Eudesmeæ.
- Series 2d.—Angophoroideæ.
- Series 2e.—Sessile, ovate to lanceolate.
- Series 2f.—Rigid semi-angular.

#### Section 3.—Small Cotyledons.

- 3a.—Crinkled Series.
- 3b.—Stellate, sub-crinkled Series.
- 3c.—Fuchsia Series.
- 3d.—Obliqua Series.
- 3e.—Acmenioides Series.
- 3f.—Amygdalina Series.
- 3g.—Glaucous—Sessile Series.
- 3h.—Sieberiana Series (semi-glaucous).
- 3i.—Glaucous, broad, rigid Series.
- 3j.—Sub-Glaucous Series.
- 3k.—Intermediate rigid Series.
- 3m.—Narrow rigid Series.
- 3n.—Narrow longitudinal Series.
- 3p.—Broad longitudinal Series.

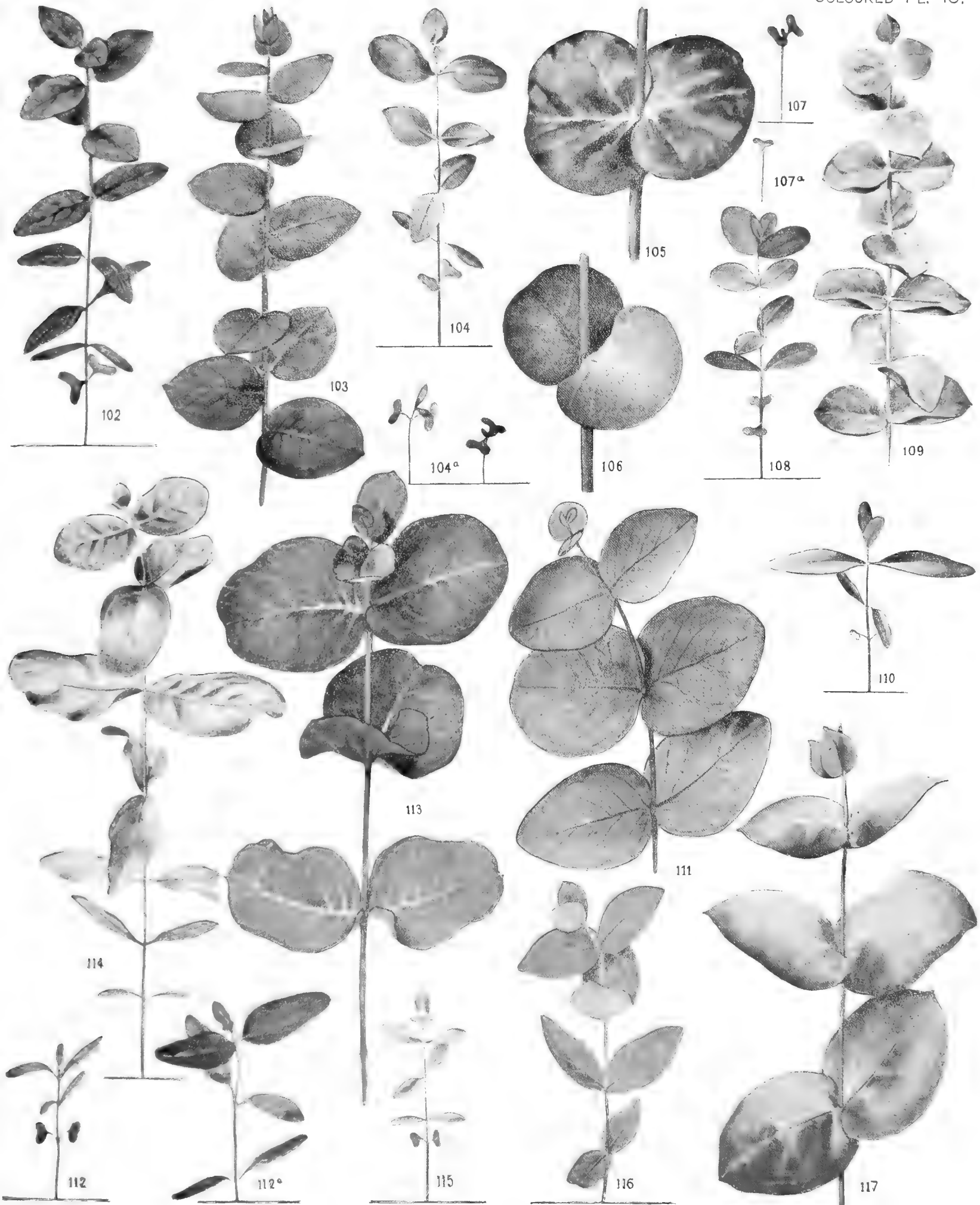
#### Desiderata.

- Appearance of Tree and Ecological Particulars.
- Bark.
- Timbers.
- Juvenile Leaves.
- Mature Leaves.
- Bursting Buds and Inflorescence in General.
- Ripe Fruits and Seeds.

Explanation of Coloured Plates 5-8.  
(Issued August, 1930.)

*E. ODORATA* BEHR. AND SCHLECHT., Figs. 88-89.*E. ALBENS* F.v.M., Figs. 92-95.*E. LEUCOXYLON* F.v.M., Figs. 98-99.*E. POPULIFOLIA* Hook., Figs. 90-91.*E. SIDEROPHLOIA* A. CUNN., Figs. 96-97.*E. PANICULATA* Sm., Figs. 100-101.





*E. STUARTIANA* F.v.M., Figs. 102-103.

*E. PULVERULENTA* SIMS, Figs. 107-109.

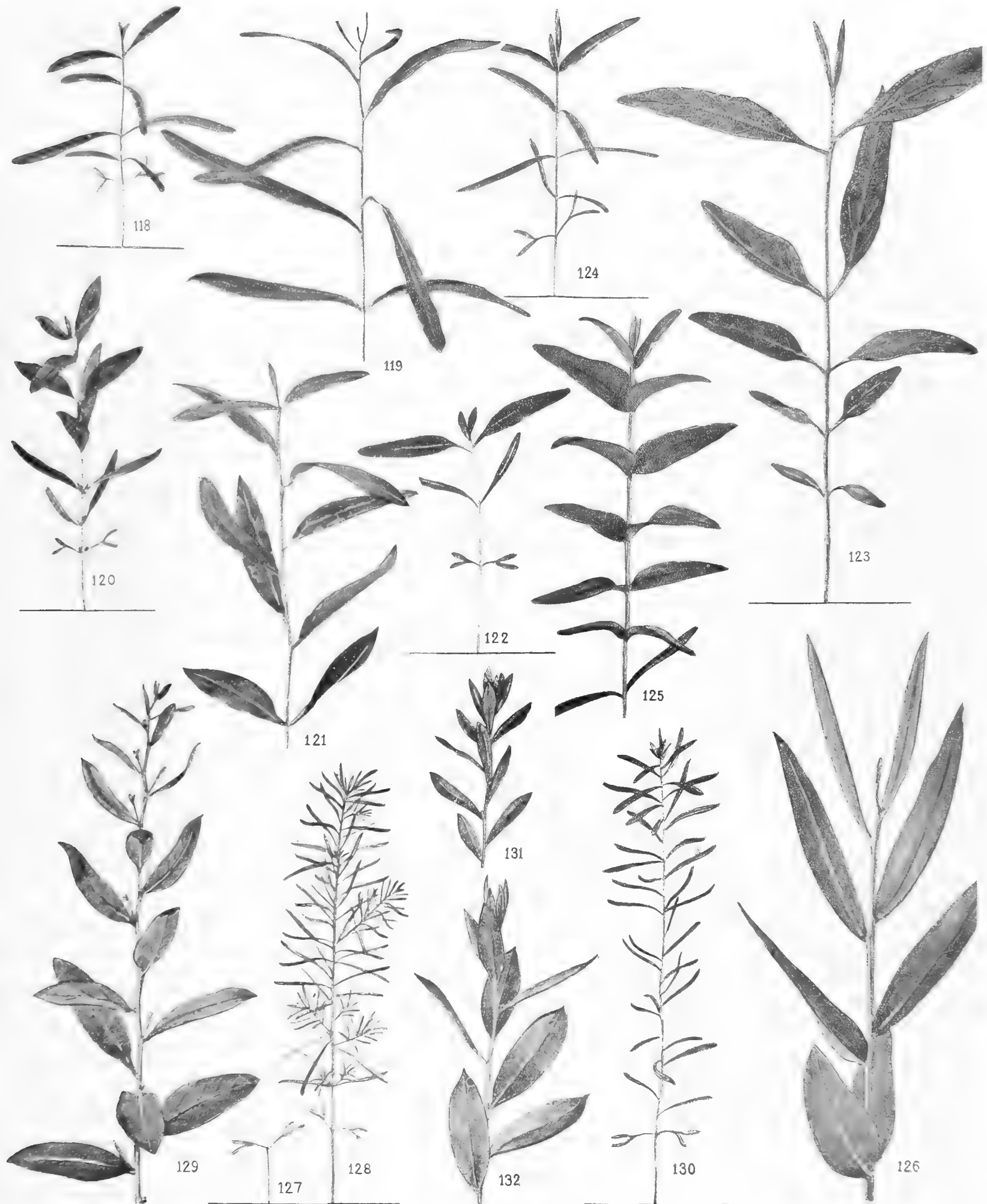
*E. ELEOPHORA* F.v.M., Figs. 112-114.

*E. CINEREA* F.v.M., Figs. 104-106.

*E. RUBIDA* DEANE AND MAIDEN, Figs. 110-111.

*E. GUNNII* HOOK., Figs. 115-117.



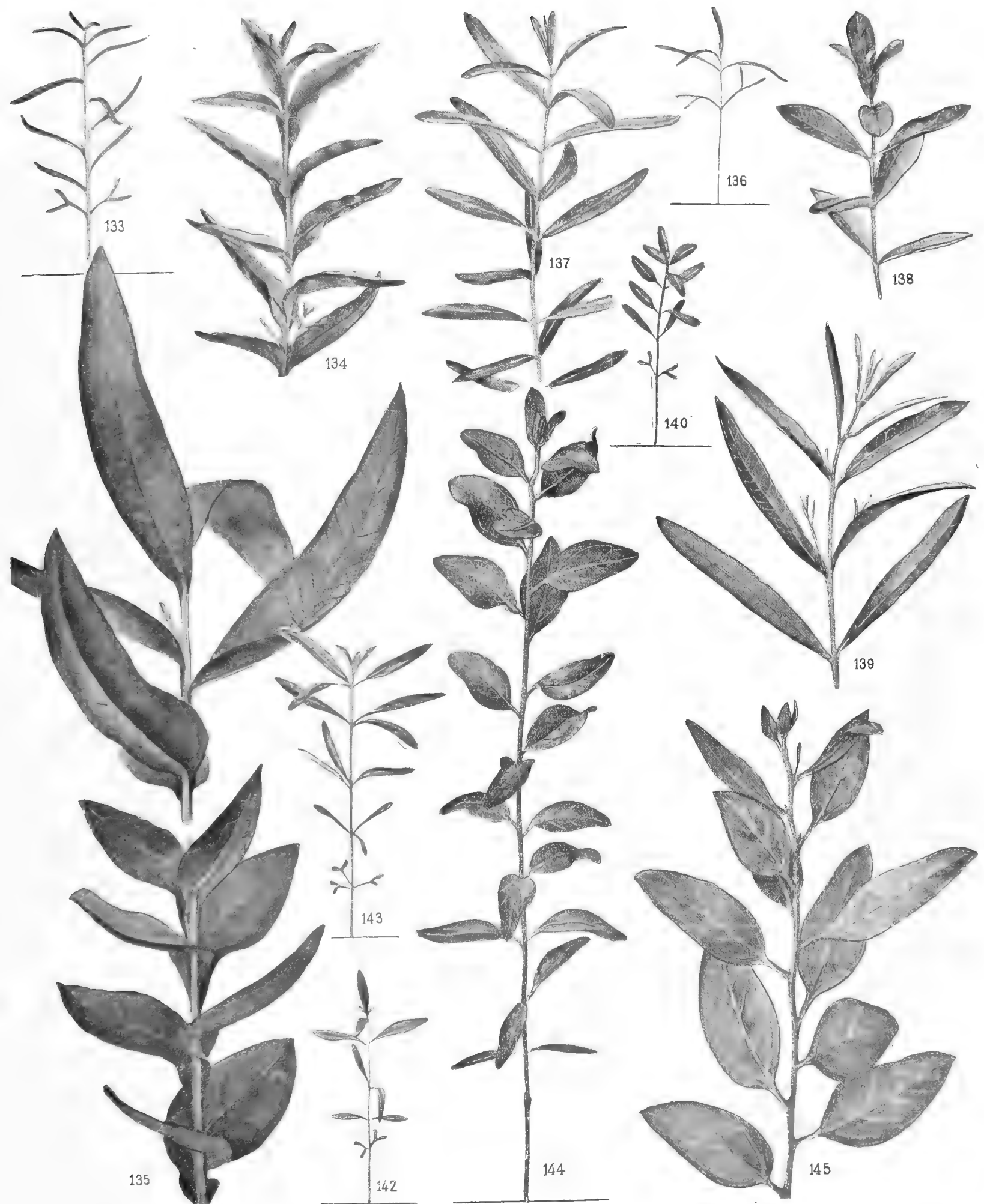


*E. CNEORIFOLIA* DC., Figs. 118-119.  
*E. SALUBRIS* F.v.M., Figs. 122-123.  
*E. GRACILIS* F.v.M., Figs. 127-129.

*E. SALMONOPHLOIA* F.v.M., Figs. 120-121.  
*E. TRANSCONTINENTALIS* MAIDEN, Figs. 124-126.  
*E. OLEOSA* F.v.M., Figs. 130-132.







*E. FLOCKTONIÆ* MAIDEN, Figs. 133-135.  
*E. LEPTOPHYLLA* F.v.M., Figs. 136-139.  
*E. CALYCOGONA* TURCZ., Figs. 140, 142-145.



PART XXXIX.

4. *E. Torrelliana* F.v.M.  
5. *E. corymbosa* Smith.  
6. *E. intermedia* R. T. Baker.  
7. *E. cuneata* F.v.M.  
8. *E. celastroides* Turczaninow.  
9. *E. gracilis* F.v.M.  
10. *E. transcontinentalis* Maiden.  
11. *E. longicornis* F.v.M.  
12. *E. ovata* F.v.M.  
13. *E. flocktoniae* Maiden.  
14. *E. virgata* Sieber.  
15. *E. oreades* R. T. Baker.  
16. *E. obtusiflora* DC.  
17. *E. fraxinoides* Deane and Maiden.  
Plates, 160-163. (Issued February, 1920.)

PART XL.

16. *E. terminalis* F.v.M.  
17. *E. dichromophloia* F.v.M.  
18. *E. pyrophora* Benth.  
19. *E. laevopinea* R. T. Baker.  
20. *E. ligustrina* DC.  
21. *E. stricta* Sieber.  
22. *E. grandis* (Hill) Maiden.  
Plates, 164-167. (Issued March, 1920.)

PART XLI.

23. *E. latifolia* F.v.M.  
24. *E. foelscheana* F.v.M.  
25. *E. abergiana* F.v.M.  
26. *E. pachyphylla* F.v.M.  
27. *E. pyriformis* Turczaninow, var. *Kingsmilli* Maiden.  
28. *E. Olafeldii* F.v.M.  
29. *E. Drummondii* Benth.  
Plates 168-171. (Issued June, 1920.)

PART XLII.

30. *E. eximia* Schauer.  
31. *E. peltata* Benth.  
32. *E. Watsoniana* F.v.M.  
33. *E. trachyphylla* F.v.M.  
34. *E. hybrida* Maiden.  
35. *E. Kruseana* F.v.M.  
36. *E. Dawsoni* R. T. Baker.  
37. *E. polyanthemos* Schauer.  
38. *E. Baueriana* Schauer.  
39. *E. conica* Deane and Maiden.  
40. *E. concolor* Schauer.  
Plates, 172-175. (Issued August, 1920.)

PART XLIII.

41. *E. ficifolia* F.v.M.  
42. *E. calophylla* R.Br.  
43. *E. haematocylon* Maiden.  
44. *E. maculata* Hook.  
45. *E. Mooreana* (W. V. Fitzgerald) Maiden.  
46. *E. approximans* Maiden.  
47. *E. Stowardii* Maiden.  
Plates 176-179. (Issued, November, 1920.)

PART XLIV.

48. *E. perfoliata* R. Brown.  
49. *E. ptychocarpa* F.v.M.  
50. *E. similis* Maiden.  
51. *E. lirata* (W. V. Fitzgerald) Maiden, n.sp.  
52. *E. Baileyana* F.v.M.  
53. *E. Lane-Poolei* Maiden.  
54. *E. Ewartiana* Maiden.  
55. *E. Bakeri* Maiden.  
56. *E. Jacksoni* Maiden.  
57. *E. eremophila* Maiden.  
Plates, 180-183. (Issued, February, 1921.)

PART XLV.

58. *E. erythrocoris* F.v.M.  
59. *E. tetrodonta* F.v.M.  
60. *E. odontocarpa* F.v.M.  
61. *E. capitellata* Smith.  
62. *E. Camfieldi* Maiden.  
63. *E. Blazlandi* Maiden and Cambage.  
64. *E. Normantonensis* Maiden and Cambage  
Plates, 184-187. (Issued April, 1921.)

PART XLVI.

65. *E. tetragona* F.v.M.  
66. *E. eudesmioides* F.v.M.  
67. *E. Ebbanoensis* Maiden n.sp.  
68. *E. Andrewsii* Maiden.  
69. *E. angophoroides* R. T. Baker.  
70. *E. Kybeanensis* Maiden & Cambage.  
71. (dup. of 252) *E. eremophila* Maiden.  
72. *E. decipiens* Endl.  
Plates, 188-191. (Issued May, 1921.)

PART XLVII.

73. *E. Laseroni* R. T. Baker.  
74. *E. de Beuzevillei* Maiden.  
75. *E. Mitchelliana* Cambage.  
76. *E. Brownii* Maiden and Cambage.  
77. *E. Cambageana* Maiden.  
78. *E. miniata* A. Cunn.  
79. *E. Woolstiana* R. T. Baker.  
80. *E. odorata* Behr. and Schlechtendal.  
81. *E. hemiphloia* F.v.M., var. *microcarpa* Maiden  
82. *E. bicolor* A. Cunn.  
83. *E. Pilligaensis* Maiden.  
84. *E. Penrithensis* Maiden.  
85. *E. micranthera* F.v.M.  
86. *E. notabilis* Maiden.  
87. *E. canaliculata* Maiden.  
Plates, 192-195. (Issued July, 1921.)

PART XLVIII.

81. *E. paniculata* Sm.  
274. *E. decorticans* sp. nov.  
275. *E. Cullenii* R. H. Cambage.  
276. *E. Beyerii* R. T. Baker.  
98. *E. globulus* Labill.  
277. *E. nova-anglica* Deane and Maiden.

I. The Growing Tree.

Rate of growth.  
Natural afforestation.  
Increment curves.  
The largest Australian trees.  
Plates 196-199. (Issued August, 1921.)

PART XLIX.

278. *E. drepanophylla* F.v.M.  
38. *E. leptophleba* F.v.M.  
279. *E. Dalrympleana* Maiden.  
280. *E. Hullii* Maiden.  
217. *E. dichromophloia* F.v.M.

I. The Growing Tree—continued.

Nanism.  
The flowering of Eucalypts while in the juvenile leaf stage.  
Dominance or aggressiveness of certain species.  
Natural grafts. Artificial grafts.  
Fasciation. Tumours and galls.  
Protuberances of the stem.  
Abortive branches (prickly stems)  
Pendulous branches.  
Vertical growth of trees.  
Plates, 200-203. (Issued September, 1921.)

PART L.

281. *E. Houseana* (W. V. Fitzgerald) Maiden.  
282. *E. Suisoni* Maiden.  
283. *E. adjuncta* Maiden.  
1. *E. pitularis* Sm., var. *pyriformis* Maiden.  
284. *E. pumila* Cambage.  
285. *E. rariflora* F. M. Bailey.  
286. *E. Mundijongensis* Maiden.

II. The Bark (and Habit).

1. Early references to Eucalyptus barks and early Eucalyptus vernaculars in general.  
2. Eucalyptus bark classifications.  
O. Mallees, Marlocks, and other small species—  
(a) True Mallees.  
(b) False Mallees.  
(c) Marlocks.  
Plates, 204-207. (Issued December, 1921.)

PART LI.

287. *E. Sheathiana* Maiden.  
288. *E. straticalyx* W. V. Fitzgerald.  
289. *E. taeniola* Baker and Smith.  
82. *E. Stricklandi* Maiden.  
290. *E. unalata* Baker and Smith.  
31. *E. Planchoniana* F.v.M.  
21. *E. marginata* Sm.  
291. *E. Irbii* Baker and Smith.  
292. *E. Yarraensis* Maiden and Cambage, n.sp.

II. The Bark (and Habit)—continued.

1. *Leioophloia* (Smooth-barks or Gums).  
2. *Hemiphloia* (Half-barks).  
3. *Rhytiphloia* (Rough-barks).  
4. *Pachyphloia* (Stringybarks).  
5. *Schizophloia* (Ironbarks).  
6. *Lepidophloia* (Barks friable and lamellate).  
Plates, 208-211. (Issued February, 1922.)

PART LII.

160. *E. amplifolia* Naudin.  
292. x *E. algeriensis* Trabut.  
293. x *E. antipointensis* Trabut.  
294. x *E. Bourrieri* Trabut.  
295. x *E. Cordieri* Trabut.  
296. x *E. gomphocornuta* Trabut.  
297. x *E. jugalis* Naudin.  
*E. occidentalis* Endl., var. *oracensis* Tra but.  
298. x *E. pseudo-globulus* (Hort.) Naudin.  
299. x *E. Trabuti* Vilmorin.  
*E. Stuartiana* x *globulus* Trabut.  
300. x *E. insizwaensis* Maiden n.sp.

II. The Bark—concluded.

3. Classification of Trees in General by Means of their Barks.  
4. Variation in Barks of the same Species.  
5. Bark in Relation to Heat and Cold.  
6. Adventitious Shoots.  
7. Ringbarking.  
8. Coppice-growth (suckering).  
9. Twist in Bark.  
10. Bark Repair.  
11. Microscopic Characters of Bark.  
12. Calcium Oxalate.  
13. Tannin.  
14. Oil in Bark.  
15. Fibre in Bark.  
16. Colour of Inner Bark  
17. Colour of Outer Bark.  
Plates, 212-215. (Issued April, 1922.)

PART LIII.

301. x *E. Barmedmanensis* Maiden n.sp.  
302. x *E. Tenandrensis* Maiden n.sp.  
303. x *E. Peacockeana* Maiden n.sp.  
304. x *E. Stopfordi* Maiden n.sp.  
305. x *E. Forsythii* Maiden n.sp.  
306. x *E. Auburnensis* Maiden n.sp.  
307. x *E. Yagobieii* Maiden n.sp.  
308. x *E. Blackburniana* Maiden.  
309. x *E. Studleyensis* Maiden n.sp.

III. Timber.

Historical.—Early Attempts at Classification  
Modern Systems of Classification.  
Colours.  
Plates, 216-219 (Issued May, 1922.)

PART LIV.

310. *E. McIntyrensis* n.sp.

Fossil Species.

311. *E. Pluti* McCoy.  
312. *E. Kayseri* R. M. Johnston.  
313. *E. Milligani* R. M. Johnston.  
314. *E. Delftii* Ettingshausen.  
315. *E. Diemenii* Ettingshausen.  
316. *E. Hayi* Ettingshausen.  
317. *E. Houtmanni* Ettingshausen.  
318. *E. Mitchellii* Ettingshausen.  
319. *E. cretacea* Ettingshausen.  
320. *E. Davidsoni* Ettingshausen.  
321. *E. Oatleyana* Ettingshausen.  
322. *E. scoliophylla* Ettingshausen.  
323. *E. Warraghiana* Ettingshausen.  
324. *E. praecoriacea* Deane.  
325. *E. Hermani* Deane.  
326. *E. Howittii* Deane.  
327. *E. Kitsoni* Deane.  
328. *E. Suttoni* formerly *E. Muelleri* Deane.  
329. *E. Chapmani* formerly *E. Woolstii* Deane

III. Timber—concluded.

Microscopic Structure. Crystals (Calcium Oxalate).  
A Warning Note in regard to Undue Reliance on Microscopic Structure for Diagnostic Purposes. Paper Pulp.  
Heart-wood and Sap-wood. Seasoning.  
Specific Gravity. Hardness.  
Fissility and Interlockedness. Inflammability  
Destructive Distillation. Ash.  
Plates, 220-223. (Issued July, 1922.)

PART LV.

Fossil Plants Attributed to Eucalyptus.

- A.—*E. oceanica* Unger.  
B.—*E. Haeringiana* Ettingshausen.  
C.—*E. Aegea* Unger.  
D.—*Myrtophyllum* (*Eucalyptus* ?) *Geinitzi* Heer.  
E.—*Myrtophyllum* (*Eucalyptus* ?) *Schubleri* Heer.  
F.—*E. sibirica* Heer.  
G.—*E. (?) americana* Lesqx.  
H.—*E. borealis* Heer.  
I.—*E. angusta* Velenovsky.  
J.—*E. dubia* Ettingshausen.  
K.—*E. dakotensis* Lesquereux.  
L.—*E. Gouldii* Ward.  
M.—*E. proto-Geinitzi* Saporta.  
N.—*E. Choffati* Saporta.  
O.—*E. (?) attenuata* Newberry.  
P.—*E. (?) angustifolia* Newberry.  
Q.—*E. (?) nervosa* Newberry.  
R.—*E. (?) parvifolia* Newberry.  
S.—*E. latifolia* Hollick.  
T.—*E. Wardiana* Berry.  
*Myrcia havanensis* Berry.

IV. The Root.

Adventitious Roots.

V. Exudates.

- a. Kinos.  
b. Mannas.  
Plates, 224-227. (Issued August, 1922.)

PART LVI.

330. *E. Jensenii* n.sp.  
331. *E. Umbrawarrensis* n.sp.  
332. *E. leptophylla* F.v.M.  
68. *E. uncinata* Turcz.  
333. *E. angusta* n.sp.  
21. *E. marginata* Sm.  
22. *E. buprestium* F.v.M.  
41. *E. Bosistoana* F.v.M.  
213. *E. altior* (Deane and Maiden) Maiden.  
334. *E. conglobata* (R.Br.), Maiden.  
335. *E. angulosa* Schauer.  
146. *E. Johnstoni* n.sp.

VI. The Leaf.

A.—Juvenile Leaf. Historical. Morphological, Diel's Law, Cautehouc.  
Plates, 228-231. (Issued September, 1922.)

PART LVII.

336. *E. agglomerata* Maiden.  
337. *E. Simmondsii* n.sp.  
23. *E. sepulchralis* F.v.M.  
200. *E. torquata* Luehmann.  
338. *E. Kalganensis* n.sp.  
339. *E. melanoxylon*, n.sp.  
240. *E. Isingiana* n.sp.  
134. *E. aggregata* Deane and Maiden.

VI. The Leaf—concluded.

B.—The Mature Leaf. Historical.—Venation (chiefly).

Plates, 232-235. (Issued January, 1923.)

PART LVIII.

341. *E. collina* W. V. Fitzgerald, n.sp.  
212. *E. Flocktonia* Maiden.  
342. *E. Shirleyi* n.sp.  
343. *E. Rummeryi* n.sp.  
344. *E. Herbertiana* n.sp.  
345. *E. Comitæ-Vallis* n.sp.  
107. *E. longifolia* Link and Otto.  
346. *E. citriodora* Hooker.  
43. *E. hemiphloia* F.v.M.  
347. *E. microcarpa* n.sp.  
348. *E. albens* Miquel.

VII. Inflorescence.

A.—Its Branching. Historical. Opereulum, &c.  
Plates, 236-239. (Issued February, 1923.)

PART LIX.

54. *E. pruinosa* Schauer.  
53. *E. melanophloia* F.v.M.  
135. *E. Gunnii* Hook, f.  
211. *E. longicornis*, F.v.M.  
152. *E. propinqua*. Deane and Maiden, var. *major* n. var.  
35. *E. haemastoma* Sm.  
349. *E. micrantha* DC.  
350. *E. Shiresii* Maiden and Blakely, n.sp.  
351. *E. crucis*, n.sp.  
212. *E. Flocktonia* Maiden.

VII. Inflorescence (in part)—continued.

D.—Androeceum. Anther. Gynoeceum. Ovary, &c.  
Plates, 240-243. (Issued April, 1923.)

PART LX.

VIII. The Fruit.

Historical. Capsule. Valves. Rim.  
Plates, 244-247. (Issued, June, 1923.)

PART LXI.

352. *E. fastigata* Deane and Maiden.  
353. *E. xanthonema* Turczaninow.  
354. *E. Schlechteri* Diels.  
29. *E. apiculata* Baker and Smith.  
33. *E. Sieberiana* F.v.M.  
28. *E. virgata* Sieb.  
46. *E. acacioides* A. Cunn.  
56. *E. Naudiniana* F.v.M.  
59. *E. Caley* Maiden.  
64. *E. Baueriana* Schauer.  
75. *E. falcata* Turcz.  
194. *E. Spenceriana* Maiden.  
201. *E. radiata* Sieb.  
202. *E. numerosa* Maiden.  
203. *E. nitida* Hook, f.  
252. *E. eremophila* Maiden, var. *grandiflora* n. var.  
Enemies of Eucalypts.

VII. The Inflorescence and

VIII. The Fruit (concluded).

Deciduous Stamiferous Ring. Disc of the Flower. Disc of the Fruit.

Plates 248-251. (Issued September, 1923.)

PART LXII.

355. *E. Gardneri* n.sp.  
356. *E. astringens* n.sp.  
357. *E. Sargenti*, n.sp.  
11. *E. Risdoni* Hook, f., var. *elata* Benth.  
358. x *E. Chisholmi* Maiden and Blakely, n.sp.  
359. x *E. Taylora* n.sp.  
73. *E. oleosa* F.v.M.  
206. *E. intermedia* R. T. Baker.  
360. *E. Novraensis* n.sp.  
Plates 252-255. (Issued March, 1924.)

PART LXIII.

211. *E. longicornis* F.v.M.  
175. *E. Websteriana* Maiden.  
361. *E. nutans* F.v.M.

IX.—The Seed.

1. Historical.  
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